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ORIGINAL COMMUNICATIONS.

ART. I. *The Poetry of Architecture.* By KATA PHUSIN.

No. 2. THE COTTAGE — continued.

V. *A Chapter on Chimneys.*

IT appears from the passage in Herodotus, which we alluded to in the last paper, that there has been a time, even in the most civilised countries, when the king's palace was entirely unfurnished with anything having the slightest pretension to the dignity of chimney tops; and the savoury vapours which were wont to arise from the hospitable hearth, at which the queen or princess prepared the feast with the whitest of hands, escaped with indecorous facility through a simple hole in the flat roof. The dignity of smoke, however, is now better understood, and it is dismissed through Gothic pinnacles, and (as at Burleigh House) through Tuscan columns, with a most praiseworthy regard to its comfort and convenience. Let us consider if it is worth the trouble. We advanced a position in the last paper, that silence is never perfect without motion, that is, unless something which might possibly produce sound, is evident to the eye: the absence of sound is not surprising to the ear, and, therefore, not impressive. Let it be observed, for instance, how much the stillness of a summer's evening is enhanced by the perception of the gliding and majestic motion of some calm river, strong but still; or of the high and purple clouds; or of the voiceless leaves, among the opening branches: to produce this impression, however, the motion must be uniform, though not necessarily slow. One of the chief peculiarities of the ocean thoroughfares of Venice, is the remarkable silence which rests upon them, enhanced, as it is, by the swift, but beautifully uniform motion of the gondola. Now, there is no motion more uniform, silent, or beautiful, than that of smoke; and, therefore, when we wish the peace or stillness of a scene to be impressive, it is highly useful to draw the attention to it.

In the cottage, therefore, a building peculiarly adapted for scenes of peace, the chimney, as conducting the eye to what is agreeable, may be considered an important, and, if well managed,

a beautiful accompaniment. But in buildings of a higher class, smoke ceases to be interesting. Owing to their general greater elevation, it is relieved against the sky, instead of against a dark back ground, thereby losing the fine silvery blue, which, among trees, or rising out of distant country, is so exquisitely beautiful, and assuming a dingy yellowish black: its motion becomes useless; for the idea of stillness is no longer desirable, or, at least, no longer attainable, being interrupted by the nature of the building itself: and, finally, the associations it arouses are not dignified; we may think of a comfortable fireside, perhaps, but are quite as likely to dream of kitchens, and spits, and shoulders of mutton. None of these imaginations are in their place, if the character of the building be elevated; they are barely tolerable in the dwellinghouse and the street. Now, when smoke is objectionable, it is certainly improper to direct attention to the chimney; and, therefore, for two weighty reasons, *decorated* chimneys, of any sort or size whatsoever, are inexcusable barbarisms; first, because, where smoke is beautiful, decoration is unsuited to the building; and, secondly, because, where smoke is ugly, decoration directs attention to its ugliness. It is unfortunately a prevailing idea with some of our architects, that what is a disagreeable object in itself may be relieved or concealed by lavish ornament; and there never was a greater mistake. It should be a general principle, that what is intrinsically ugly should be utterly destitute of ornament, that the eye may not be drawn to it. The pretended skulls of the three Magi at Cologne are set in gold, and have a diamond in each eye; and are a thousand times more ghastly than if their brown bones had been left in peace. Such an error as this ought never to be committed in architecture. If any part of the building has disagreeable associations connected with it, let it alone: do not ornament it; keep it subdued, and simply adapted to its use; and the eye will not go to it, nor quarrel with it. It would have been well if this principle had been kept in view in the renewal of some of the public buildings in Oxford. In All Souls College, for instance, the architect has carried his chimneys half as high as all the rest of the building, and fretted them with Gothic. The eye is instantly caught by the plated-candlestick-like columns, and runs with some complacency up the groining and fretwork, and alights finally and fatally on a red chimney top. He might as well have built a Gothic aisle at an entrance to a coal wharf. We have no scruple in saying that the man who could desecrate the Gothic trefoil into an ornament for a chimney has not the slightest feeling, and never will have any, of its beauty or its use; he was never born to be an architect, and never will be one.

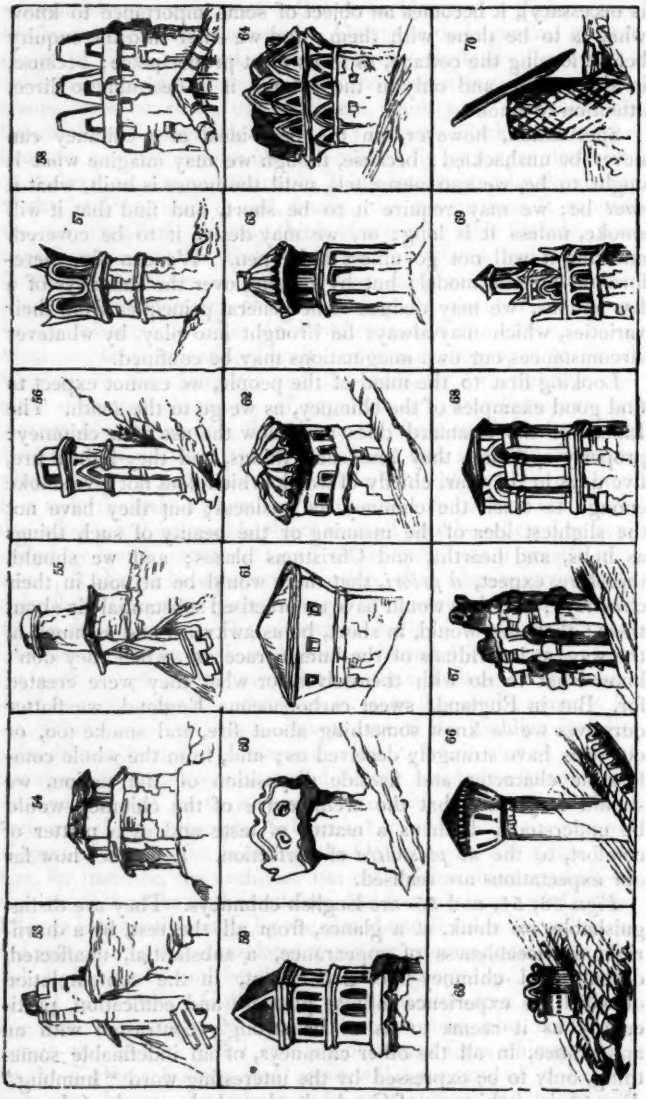
Now, if chimneys are not to be decorated (since their existence

is necessary), it becomes an object of some importance to know what is to be done with them: and we enter into the enquiry before leaving the cottage, as in its most proper place; because, in the cottage, and only in the cottage, it is desirable to direct attention to smoke.

Speculation, however, on the beau-ideal of a chimney can never be unshackled; because, though we may imagine what it ought to be, we can never tell, until the house is built, what it *must* be; we may require it to be short, and find that it will smoke, unless it is long; or, we may desire it to be covered, and find it will not go unless it is open. We can fix, therefore, on no one model; but by looking over the chimneys of a few nations, we may deduce some general principles from their varieties, which may always be brought into play, by whatever circumstances our own imaginations may be confined.

Looking first to the mind of the people, we cannot expect to find good examples of the chimney, as we go to the south. The Italian or the Spaniard does not know the use of a chimney: properly speaking, they *have* such things, and they light a fire, five days in the year, chiefly of wood, which does not give smoke enough to teach the chimney its business; but they have not the slightest idea of the meaning or the beauty of such things as hobs, and hearths, and Christmas blazes; and we should, therefore, expect, *à priori*, that there would be no soul in their chimneys; that they would have no practised substantial air about them; that they would, in short, be as awkward and as much in the way, as individuals of the human race are, when they don't know what to do with themselves, or what they were created for. But in England, sweet carbonaceous England, we flatter ourselves we *do* know something about fire, and smoke too, or our eyes have strangely deceived us; and, from the whole comfortable character and fireside disposition of the nation, we should conjecture that the architecture of the chimney would be understood, both as a matter of taste and as a matter of comfort, to the *ne plus ultra* of perfection. Let us see how far our expectations are realised.

Figs. 53, 54, and 55. are English chimneys. They are distinguishable, we think, at a glance, from all the rest, by a downright serviceableness of appearance, a substantial, unaffected, decent, and chimney-like deportment, in the contemplation of which we experience infinite pleasure and edification, particularly as it seems to us to be strongly contrasted with an appearance, in all the other chimneys, of an indefinable something, only to be expressed by the interesting word "humbug." *Fig.* 53. is a chimney of Cumberland, and the north of Lancashire. It is, as may be seen at a glance, only applicable at the extremity of the roof, and requires a bent flue. It is built



of unhewn stones, in the same manner as the Westmoreland cottages; the flue itself being not one third the width of the

chimney, as is seen at the top, where four flat stones placed on their edges form the termination of the flue itself, and give lightness of appearance to the whole. Cover this with a piece of paper, and observe how heavy and square the rest becomes. A few projecting stones continue the line of the roof across the centre of the chimney, and two large masses support the projection of the whole, and unite it agreeably with the wall. This is exclusively a cottage chimney; it cannot, and must not, be built of civilised materials; it must be rough, and mossy, and broken; but it is decidedly the best chimney of the whole set. It is simple and substantial, without being cumbrous; it gives great variety to the wall from which it projects, terminates the roof agreeably, and dismisses its smoke with infinite propriety.

Fig. 54. is a chimney common over the whole of the north of England; being, as I think, one that will go well in almost any wind, and is applicable at any part of the roof. It is also roughly built, consisting of a roof of loose stones, sometimes one large flat slab, supported above the flue by four large supports, each of a single stone. It is rather light in its appearance, and breaks the ridge of a roof very agreeably. Separately considered, it is badly proportioned; but, as it just equals the height to which a long chimney at the extremity of the building would rise above the roof (as in *fig.* 53.), it is quite right *in situ*, and would be ungainly if it were higher. The upper part is always dark, owing to the smoke, and tells agreeably against any background seen through the hollow.

Fig. 55. is the chimney of the Westmoreland cottage which formed the subject of the last paper (p. 97.). The good taste which prevailed in the rest of the building is not so conspicuous here, because the architect has begun to consider effect instead of utility, and has put a diamond-shaped piece of ornament on the front (usually containing the date of the building), which was not necessary, and looks out of place. He has endeavoured to build neatly too, and has bestowed a good deal of plaster on the outside, by all which circumstances the work is infinitely deteriorated. We have always disliked cylindrical chimneys, probably because they put us in mind of glasshouses and manufactories, for we are aware of no more definite reason; yet this example is endurable, and has a character about it which it would be a pity to lose. Sometimes when the square part is carried down the whole front of the cottage, it looks like the remains of some grey tower, and is not felt to be a chimney at all. Such deceptions are always very dangerous, though in this case sometimes attended with good effect, as in the old building called Coniston Hall, on the shores of Coniston

Water, whose distant outline (*fig.* 71.) is rendered light and picturesque, by the size and shape of its chimneys, which are the same in character as *fig.* 55.

Of English chimneys adapted for buildings of a more elevated character, we can adduce no good examples. The old red brick mass, which we see in some of our venerable manor-houses, has a great deal of English character about it, and is always agreeable, when the rest of the building is of brick. *Fig.* 67. is a

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chimney of this kind: there is nothing remarkable in it; it is to be met with all over England; but we have placed it beside its neighbour *fig.* 68., to show how the same form and idea are modified by the mind of the nations who employ it. The design is the same in both, the proportions also; but the one is a chimney, the other a paltry model of a paltrier edifice. *Fig.* 68. is Swiss, and is liable to all the objections advanced against the Swiss cottages; it is a despicable mimicry of a large building, like the tower in the engraving of the Italian cottage (fig. 40. p. 104.), carved in stone, it is true, but not the less to be reprobated. *Fig.* 67., on the contrary, is adapted to its use, and has no affectation about it. It would be spoiled, however, if built in stone; because the marked bricks tell us the size of the whole at once, and prevent the eye from suspecting any

intention to deceive it with a mockery of arches and columns, the imitation of which would be too perfect in stone; and therefore, even in this case, we have failed in discovering a chimney adapted to the higher class of edifices.

Fig. 56. is a Netherland chimney, *figs.* 57 and 58. German. *Fig.* 56. belongs to an old Gothic building in Malines, and is a good example of the application of the same lines to the chimney which occur in other parts of the edifice, without bestowing any false elevation of character. It is roughly carved in stone, projecting at its base grotesquely from the roof, and covered at the top. The pointed arch, by which its character is given, prevents it from breaking in upon the lines of the rest of the building, and, therefore, in reality renders it less conspicuous than it would otherwise have been. We never should have noticed its existence, had we not been looking for chimneys.

Fig. 57. is also carved in stone, and where there is much variety of architecture, or where the buildings are grotesque, would be a good chimney, for the very simple reason, that it resembles nothing but a chimney, and its lines are graceful. *Fig.* 58., though ugly in the abstract, might be used with effect in situations where perfect simplicity would be too conspicuous; but both *figs.* 57. and 58. are evidently the awkward efforts of a tasteless nation, to produce something original: they have lost the chastity which we admired in *fig.* 53., without obtaining the grace and spirit of *figs.* 63. and 66. In fact, they are essentially German.

Figs. 60. to 64., inclusive, are Spanish, and have a peculiar character, which would render it quite impossible to employ them out of their own country. Yet they are not decorated chimneys. There is not one fragment of ornament on any of them. All is done by variety of form; and with such variety no fault can be found, because it is necessary to give them the character of the buildings, out of which they rise. For we may observe here, once for all, that character may be given either by form or by decoration, and that where the latter is improper, variety of the former is allowable, because the humble associations which render ornament objectionable, also render simplicity of form unnecessary.* We need not then find fault with *fantastic* chimneys, provided they are kept in unison with the rest of the building, and do not draw too much attention.

Fig. 60., according to this rule, is a very good chimney. It is graceful without being pretending, and its grotesqueness well suits the buildings round it—we wish we could give them: they are at Cordova.

* Elevation of character, as was seen in the Italian cottage, depends upon simplicity of form.

Figs. 62. and 63. ought to be seen, as they would be in reality, rising brightly up against the deep blue heaven of the south, the azure gleaming through their hollows; unless perchance a slight breath of refined, pure, pale vapour finds its way from time to time out of them into the light air; their tiled caps casting deep shadows on their white surfaces, and their *tout ensemble* causing no interruption to the feelings excited by the Moresco arches and grotesque dwelling-houses with which they would be surrounded; they are sadly spoiled by being cut off at their bases.

Figs. 59. 65, and 66. are Italian. *Fig.* 59. has only been given, because it is constantly met with among the more modern buildings of Italy. *Figs.* 65. and 66. are almost the only two varieties of chimneys which are to be found on the old Venetian palaces (whose style is to be traced partly to the Turk, and partly to the Moor). The curved lines of *fig.* 65. harmonise admirably with those of the roof itself, and its diminutive size leaves the simplicity of form of the large building to which it belongs entirely uninterrupted and uninjured. *Fig.* 66. is seen perpetually carrying the whiteness of the Venetian marble up into the sky; but it is too tall, and attracts by far too much attention, being conspicuous on the sides of all the canals. *Figs.* 68, 69, and 70. are Swiss. *Fig.* 69. is one specimen of an extensive class of decorated chimneys, met with in the north-eastern cantons. It is never large, and consequently having no false elevation of character, and being always seen with eyes which have been prepared for it, by resting on the details of the Swiss cottage, is less disagreeable than might be imagined, but ought never to be imitated. The pyramidal form is generally preserved, but the design is the same in no two examples.

Fig. 70. is a chimney very common in the eastern cantons, the principle of which we never understood. The oblique part moves on a hinge, so as to be capable of covering the chimney like a hat, and the whole is covered with wooden scales, like those of a fish. This chimney sometimes comes in very well among the confused rafters of the mountain cottage, though it is rather too remarkable to be in good taste.

It seems then, that out of the eighteen chimneys, which we have noticed, though several possess character, and one or two elegance, only two are to be found fit for imitation; and, of these, one is exclusively a *cottage* chimney. This is somewhat remarkable, and may serve as a proof: —

1st, Of what we at first asserted, that chimneys which in any way attract notice (and if these had not, we should not have sketched them) were seldom to be imitated; that there are few buildings which require them to be singular, and none which can tolerate them if decorated; and that the architect should always

remember that the size and height being by necessity fixed, the form which draws least attention is the best.

2dly, That this inconspicuousness is to be obtained, not by adhering to any model of simplicity, but by taking especial care that the lines of the chimney are no interruption, and its colour no contrast, to those of the building to which it belongs. Thus, *figs.* 60. to 64. would be far more actually remarkable, in their natural situation, if they were more simple in their form; for they would interrupt the character of the rich architecture by which they are surrounded. *Fig.* 56., rising as it does above an old Gothic window, would have attracted instant attention, had it not been for the occurrence of the same lines in it which prevail beneath it. The form of *fig.* 65. only assimilates it more closely with the roof on which it stands. But we must not *imitate* chimneys of this kind, for their excellence consists only in their agreement with other details, separated from which they would be objectionable; we can only follow the principle of the design, which appears, from all that we have advanced, to be this: we require, in a good chimney, *the character of the building to which it belongs divested of all its elevation, and its prevailing lines deprived of all their ornament.*

This it is, no doubt, excessively difficult to give; and, in consequence, there are very few cities or edifices in which the chimneys are not objectionable. We must not, therefore, omit to notice the fulfilment of our expectations, founded on English character; the only two chimneys fit for imitation, in the whole eighteen, are English; and we would not infer anything from this, tending to invalidate the position formerly advanced, that there was no taste in England; but we would adduce it as a farther illustration of the rule, that what is most adapted to its purpose is most beautiful. For that we have no taste, even in chimneys, is sufficiently proved by the roof effects, even of the most ancient, unaffected, and unplastered of our streets, in which the chimneys, instead of assisting in the composition of the groups of roofs, stand out in staring masses of scarlet and black, with foxes and cocks whisking about, like so many black devils, in the smoke on the top of them, interrupting all repose, annihilating all dignity, and awaking every possible conception which would be picturesque, and every imagination which would be rapturous, to the mind of master-sweeps.

On the other hand, though they have not on the Continent the same knowledge of the use and beauty of chimneys in the abstract, they display their usual good taste in grouping, or concealing them; and, whether we find them mingling with the fantastic domiciles of the German, with the rich imaginations of the Spaniard, with the classical remains and creations of the Italian, they are never intrusive or disagreeable; and either assist the

grouping, and relieve the horizontality of the lines of the roof, or remain entirely unnoticed and insignificant, smoking their pipes in peace.

It is utterly impossible to give rules for the attainment of these effects, since they are the result of a feeling of the proportion and relation of lines, which, if not natural to a person, cannot be acquired, but by long practice and close observation; and it presupposes a power rarely bestowed on an English architect, of setting regularity at defiance, and sometimes comfort out of the question. We could give some particular examples of this grouping; but, as this paper has already swelled to an unusual length, we shall defer them until we come to the consideration of street effects in general. Of the chimney in the abstract, we are afraid we have only said enough to illustrate, without removing, the difficulty of designing it; but we cannot but think that the general principles which have been deduced, if carefully followed out, would be found useful, if not for the attainment of excellence, at least for the prevention of barbarism.

Oxford, Feb. 10.

ART. II. *Historical Notice of Solomon's Temple: with some preliminary Remarks on the Tabernacle.* From Lectures on Archæology, delivered in Paris by M. Raoul Rochette, and published in "L'Écho du Monde savant." Translated for the "Architectural Magazine," by M. L.

THE Jewish people had no works of art but such as were borrowed. Therefore, it is as a part of Phœnician archæology, that we must study two principal monuments which Hebrew architecture supplies us with; viz. the tabernacle and temple of Jerusalem, which refer to the ages of Moses and of Solomon; and both of which display Egyptian and Phœnician influence. The tabernacle, erected after the departure from Egypt, and in the Desert, recalled the idea of an Egyptian temple, or of the tent of a pastoral people; and the temple of Jerusalem reproduced this general form, with the accessories and ornaments with which the artists of Tyre embellished it.

The Tabernacle. — The sacred writings inform us, that when God had made known his laws and commandments to the Israelites, by the mouth of Moses, his prophet, he commanded them to construct a monument, which they should carry with them, and into which he would occasionally descend.

At this happy intelligence, the people immediately began the work, and brought as offerings, gold, silver, copper, odoriferous woods, skins of goats and sheep of all colours, purple and white wool, precious stones set in gold, and perfumes.

Every thing being prepared, Moses ordered an enclosure to

be made of 100 cubits long, and 50 broad *, in which the tabernacle was placed: 20 pillars of bronze were arranged on the sides, and 10 of the same metal at the ends, each 5 cubits high: the capitals were of silver, and the bases of gold. A large veil of very fine linen, stretched round this quadrangular enclosure, surrounded it like a wall. The front of the enclosure was 50 cubits.

On each side of the door was placed a double pillar covered with leaves of gold and silver; and to this double pillar were added, within the enclosure, three other pillars, arranged on each side, in a straight line, so as to form a vestibule 5 cubits in depth.

A veil 20 cubits long and 5 broad enclosed the entrance: it was woven of purple and hyacinth-coloured linen, and represented images of cherubim, to which we shall hereafter refer.

In the vestibule stood a large vessel of copper, supported by a base of the same metal, from which the sacrificing priest took the water for ablutions.

The tabernacle, which was 30 cubits long and 20 broad, was placed in the middle of this enclosure. The entrance was turned towards the east, that the sun might illuminate it with its first beams. Each side was composed of 20 planks of wood, covered within and without with plates of gold, cut in right angles, the breadth of each being a cubit and a half. The tabernacle was divided into three parts in its whole length; and this division, according to Josephus, represented the symbolical figure of the world. The space in the middle, enclosed by columns and veils of linen, was called The Holy of Holies, or The Most Holy.

To cover the top and sides of the tabernacle, 10 pieces of tapestry, 28 cubits long and 4 wide, were fastened to the woodwork by clasps of bronze gilt.

It is evident, from this succinct description, that the tabernacle, a monument of a mixed style, borrowed from the Egyptians and Phœnicians, had, so to speak, no character peculiar to itself; and clearly expressed how much the Jews had borrowed from the systems of architecture of these two nations, and how much they respected the law of Moses, which prohibited the Jews from using sculpture and other imitative arts.

Solomon's Temple. † — The city of Jerusalem, according to the *Jewish Antiquities*, was seated on two hills facing each other, and separated by a magnificent valley. The highest hill was called the high city, the other, named *Arca*, was the site of the low city, and faced, on the east side, Mount Moriah, on which Solomon erected his temple.

* The Hebrew cubit is about 1½ ft.

† See Third Book of Kings, Second of the Paralipomena, and the works of Vilalpond, Calmet, and Bernard Lamy.

This mountain being only an irregular hill at first, it was necessary, in order to extend the appurtenances of the temple on a level surface, to support the sides by enormous constructions. The eastern sides skirted the valley of Cedron; that of the south was furnished with a wall of masonry, of 300 cubits in height; the western side was in the form of a theatre; and that of the north was separated from the temple by a large ditch.

About six centuries after the construction of the tabernacle, David, having taken possession of the city of Salem, drove out all the Jebusites, repaired the breaches, rebuilt the dwelling-houses, and resolved to establish here the seat of his government, by raising a temple to the Eternal, and giving to this city the name of *Hieru-Salem*, Jerusalem, or *Sacred City*. But the following night the Lord appeared to the prophet Nathan, and spoke to him in these words: —

" Go find my servant David, and tell him: Behold what the Lord sayeth: I shall place upon the throne after you your son, who shall proceed from you, and I shall establish his kingdom. He shall build a house to my name, and I shall render the throne of his kingdom secure for ever."

David having learnt from Nathan that his kingdom should descend to his posterity, and that one of his children should build a temple, went immediately to prostrate himself before the tabernacle and return thanks to God for this favour.

Solomon, son of David, in the fourth year of his reign, and in the month Jar (April), 592 years after the departure from Egypt, 1440 years after the Deluge, and 3102 after the creation of the world, realised the grand intention of his father, by erecting a temple to the Eternal on Mount Moriah. As there was a want of wood and artists in Judea, he wrote on this subject to Iraam, or Hiram, king of Tyre, who sent him hewers of stone, sculptors, and casters of metals. The correspondence occasioned by this negotiation was still in existence in the time of Josephus, at Jerusalem, and in the archives of the city of Tyre.

" Hiram, having heard the words of Solomon, was greatly delighted, and gave him wood of cedar and pine, as much as he desired. Solomon also chose workmen, and commanded that 30,000 men should be appointed for this work. He sent them to Lebanon in turns, 10,000 each month, so that they remained two months at home. Adoniram had the superintendence of all these people. Solomon had 70,000 labourers who carried burdens, and 80,000 who cut the stones on the mountain; besides those who had the superintendence over each work, and who were 3300 in number."

This magnificent temple was 60 cubits long, only 20 broad,

according to Josephus, and 30 cubits high. On this edifice was raised another of the same size, which made the general height of the temple 60 cubits: round it were 30 chambers, of 25 cubits in length and 20 in height, built in the form of galleries, and communicating with each other.

It was in these chapels, as they may be called, that the vases, and all the precious ornaments used at the sacrifices, were preserved. Josephus gives, perhaps, an exaggerated list of them.

In front of the temple was a portico, 120 cubits high by 10. These extraordinary dimensions accord so ill with the height of the temple, that most commentators have been led into error. In this difficulty they have taken the most convenient way of getting off, by saying that there must be a fault in the text. M. Hirt, himself, in his *Dissertation critique sur le Temple de Jerusalem*, is greatly mistaken in giving only 20 cubits in height, for the dimensions of the portico: it is not so. The learned German Stieglitz has clearly proved that the dimensions of the portico should be 120 cubits high by 10. This portico is, besides, only an imitation of the pylorus which preceded the Egyptian temples.

Two beautiful pillars of bronze, ornamented with circles of gold and capitals of silver, decorated the portico. These two pillars, named *Jachin* and *Boaz*, were executed by the celebrated artist, Huram, whom Solomon had sent for from Tyre: they were 35 cubits high, and their capitals five.

These pillars are referable to a system of architecture which is not unknown to us, and to the idea of theology of the first nations, that is, to religious dualism; for these round pillars are to the temple of Jerusalem what the obelisks or sphinxes were to the edifices of Nubia and Egypt, and the phalli or the cones to the temples of Gazza, Hierapolis, and Paphos. In the middle of this wonderful enclosure was placed the sea of brass, a vast basin reposing on twelve supports of the same metal, and serving for the legal purifications.

By adhering only to the details transmitted to us by the *Bible*, as the most authentic in every respect, it is possible to reconstruct the edifice almost entirely.

The temple of Solomon was composed of a *cella* 60 cubits long. This cella was divided into two very distinct parts, by the pillars of cedar wood, covered with gold, the *Holy* and the *Most Holy* of the sanctuary: the first part, which was appropriated to the sacrifices, was 40 cubits long and 30 high; the Most Holy was 20 cubits each way: there was therefore a difference of 10 cubits between the two roofs, which has given rise to the belief of the mysterious chamber situated above the Most Holy. To the upper part of these two pillars, was

attached a veil of linen, woven with great delicacy, and representing various flowers of all colours.

It is remarkable, that windows were made in this temple: "And he made slanting windows in the temple," says the *Book of Kings*. We know that the edifices of Egypt and of Phœnicia are without windows; and, although they existed in the temple of Jerusalem, they were so narrow, that they did not light the sanctuary. Solomon also says: "The Eternal dwells in darkness." A circumstance which it would be of great advantage to know, but on which the sacred writings are silent, is the form of the roof of the temple. A flat roof would be the most analogous to the Egyptian style; but there is no proof that it was so arranged, neither do we know whether it was sloping.

The *Book of Kings*, indeed, informs us that Solomon made a ceiling (plancher) above the whole edifice; consequently it appears that the temple was covered; but we are not informed how this ceiling was made.

In the decoration of the temple, Phœnician influence is visibly manifested. No part of the wall appears; it is entirely covered by beams of cedar, and the interior partitions of wood were entirely covered with leaves of gold, rich hangings, skins of sheep, and goat's hair.

On the outside nothing was seen but the stone, and in the inside, nothing but gold. There was not a single place, according to the sacred writings, that was not overlaid with gold: the ceiling itself was covered with it. This system is evidently borrowed from the Phœnician architecture, in which only wood overlaid with gold was made use of for the interior decoration of buildings.

To adorn his temple, Solomon ordered two cherubim of solid gold, to be made, each 5 cubits high; their wings, which were also 5 cubits, were placed in such a position in the sanctuary that they covered the ark of the covenant.

Much discussion has taken place on the symbolical representation of these cherubim. According to Clement of Alexandria, they were only fantastic and imaginary beings. According to the *Bible*, on the contrary, they had wings, and consequently were ranked in the class of animals. M. Raoul Rochette thinks, and his opinion will appear very probable, that these cherubim were only sphinxes, imitated from the Egyptian and Phœnician archæology; as, according to the testimony of Ezekiel, the cherub consisted of a head placed on a body, half lion, half bull, bearing eagle's wings extended; and, from the drawings which have reached us, we find a striking resemblance between the cherubim of the Hebrew temples, and the sphinxes placed in front of the religious edifices of Nubia and Egypt.

The temple of Jerusalem was reduced to ashes by Nebuchadnezzar II., 470 years after its foundation, 598 B. C.; and, 70 years afterwards, Zorobabel laid the foundation of the second temple, which was destroyed at the taking of Jerusalem by Titus. (*L'Echo*, Dec. 6, 1837, p. 198.)

ART. III. *Brief Hints for the Preservation of the Architectural Remains of the Middle Ages.* By E. B. LAMB, F.I.B.A.

"To collect the productions of art, and examples of mechanical science or manual ability, is unquestionably useful, even when the things themselves are of small importance; because it is always advantageous to know how far the human powers have proceeded, and how much experience has found to be within the reach of diligence." (*Rambler*, No. 83.)

DURING my perambulations in various parts of the country, I have had opportunities of observing in what state many of the most useful and interesting buildings of the middle ages, ecclesiastical and domestic, are now found; in some instances neglected and falling to decay, and in others a needless sacrifice to tasteless improvers and modern innovations. It would be absurd indeed, if, in my love for the great works of past ages, I should blindly decry the wonderful improvements which are now fast spreading over the whole country; this is not my intention: it is true, I would think twice before demolishing a building which has been a lesson to the scientific architect, a delight to the lover of the picturesque, and has called forth the energetic praises of the poet for ages past. Even the railways, those wonders of modern times, which are now sweeping every thing before them, might, perhaps, sometimes, be just sufficiently turned to prevent the wholesale demolition of ancient buildings, which, I fear, some of them may cause; and, surely, this might be done, upon consideration, without prejudice to the line of road. To say, however, that all modern improvement should give place to the relics of masonic craft, would not only be contrary to my wish, but also to my interest as an architect. Improvement, indeed, is not always the reason for destroying the ancient edifices of this country: decay, which is suffered to go beyond repair, inconvenience for present customs, and, too frequently, incompetent persons, intrusted with the care of repairing them, recklessly cutting away and disturbing parts which a little ingenuity might preserve, are the principal causes, which have, in many instances, swept from us studies that might have been of the greatest value to the modern architect. If not entire buildings, at least many of the parts which had escaped the ravages of time might have been secured for our benefit, if a proper place had been assigned for

their reception. All we now see of demolished buildings is by mere chance. An industrious antiquary, or, perhaps, mere collector of curiosities, may have some choice fragments hidden in his cabinet; but these can only be seen by the few comprising his own immediate circle. As enquiry is not to be circumscribed, and new discoveries and instruction may be gained from resources which now appear trivial, it behoves every thinking being to assist in the preservation of such records as are within his power, that he may, at least, have the gratification of having, in some measure, contributed to the welfare of his fellow-creatures. With this view, these observations have been hastily penned, as hints for the preservation of ancient architecture, either in buildings now existing, or in fragments which have necessarily been displaced from unavoidable circumstances. This could be done in such places and manner that they might be easily referred to, not only by the antiquary and the architect, but by the ordinary sight-seer, who frequently spends his time in gazing at the usual show places, without any peculiar object. To the historian, ancient architecture is a book of reference, where he reads, in the rude decorations it displays, many of the customs of past ages in no other way recorded. Too often, there are details of crimes of the blackest dye, and tyranny the most oppressive: but crimes are not the only memorials he finds in such works, virtues are unsparingly immortalised by the hand of the sculptor. Statues of benefactors to churches and charities were conspicuously interspersed among saints and angels in the cathedrals; and, in other buildings, we are frequently reminded of a good deed, by the statue of a munificent donor; nor is the fact less interesting, although conveyed to us in a simple and rude manner of execution. In many cases, perhaps, this is the only record of a name which ought to stand on the tablets of our memory, as an example of some bright star shedding its influence in the midst of the darkest ages of superstition and oppression. Here the historian seeks for his heroes, who have nobly fallen in defending their patrimony; here, too, he finds the direful effect of civil wars; in the contemplation of these remains, his mind is richly stored with historical truths which are every day becoming more visionary, as the romantic legends, which are too frequently relied upon as authentic records, are, in many instances, only transmitted by oral tradition. If to the historian the remains of antiquity are of importance, how infinitely more so are they to the architect, who is awe-stricken at the daring results of the great scientific knowledge of the masters of the craft. He looks with wonder at the lofty spire, beautifully proportioned, gradually carrying the eye, step by step, to the summit; the great variety displayed in ancient edifices, the amazing sparkle of the different parts, and yet the

perfect harmony of the whole; he is impressed with the boldness of the groining of stone, more elaborate in its mysterious windings than the richest embroidery; he views with delight and veneration the continued and lofty vaulting, which appears to hang in mid air; and he is astonished at the fertile genius that produced the luxuriant ramifications of the traceried window. He examines these works closely, and endeavours to dive into the deep mystery which still hangs over the principles which governed the labours of the master minds which erected them: every new object he looks upon as a step advanced in his study, and every mutilation as so much loss to the art. But how are these objects to be preserved, when the hand of improvement is grasping every thing within its reach? Easily and effectually. When it is necessary to destroy any of these wonders of art, let the best and most useful of the ornamental fragments be deposited in the large and now useless naves of our cathedrals: there cannot be more appropriate places; surrounded as they would then be by works of the same period, which would be rendered still more interesting and useful by these important accessaries. Any objections that could be started to this arrangement surely would only be made by the over-fastidious: in this part of the cathedral none of the forms and ceremonies of our religion are performed, and in this situation a useful and highly interesting classification of the architecture of the middle ages might be arranged in every cathedral in the country, without in the least interfering with the convenience of, or cumbering, the building. Between the columns of the nave, and against the walls of the ailes, might be arranged fragments; which, even when in the building they belonged to, could not be better seen or better understood; and a judicious classification would give picturesque effect and interest to these parts of our ecclesiastical buildings which they never before obtained. What a field of interest and instruction would thus be thrown open to the whole community! How easily might these fragments bear their own brief history! For instance, I will merely suppose the fragment of a rich moulded arch; it would only be necessary to mention where it came from, the span and height of the arch, and all other matters relating to the building might be kept, and would be kept, in histories devoted to the purpose. I need not mention in how many different ways these things may be impressed on our minds; and the opportunity this would give for that general knowledge and love of architecture which is so necessary for the promotion of the art. Here the idler, who previously sought the cathedral merely as a place of curiosity, and without any other reason for so doing than that of killing time, or doing as others have done before him, might, almost imperceptibly, acquire an interest he never before thought of; and this might be the

means of turning a useless member of society into a useful one, and of applying resources for the benefit of science which before were only wasted in idle dissipation. It must not be imagined, however, that I expect every one who entered the cathedral would have the same feeling on this subject. I am aware that it requires a mind generally predisposed to the pursuit, and that great time and application are necessary to become versed in this study: but a good, clear, and well-arranged classification might be so briefly and evidently explained, that it would be understood by, and would become interesting to, the most ordinary capacity.

In the preservation of the remains of the architecture of the middle ages, if only a few are benefited or interested in their study, even then a great object will be gained; and as they then would be placed within the reach of every professor of the art, it would be a step to the study of the architecture of their own country, in a superior way than that now generally pursued. It would induce a fuller enquiry into the principles of the composition of the ancient architects, and might effectually put a stop to the bad taste, so prevalent of late, for making miniature imitations of cathedrals, castellated cottages, and Gothic steam engines.

To the ecclesiastical members of the church, and all others officially engaged therein, or in the least desirous of preserving the edifices of the middle ages, these relics would be of the highest importance; not only to assist in the restoration and repairs of ancient architecture, but in ascertaining any date upon which the least doubt had been thrown. They would be of use to all; and, by becoming the objects of a laudable curiosity, would imperceptibly assist in refining the taste of the lower orders, and securing the patronage of the higher.

ART. IV. *On the Establishment of a Society for the Restoration of ancient Buildings.* By M.

ABOUT a year ago it was contemplated to form a society for the purpose of raising funds for the repair and restoration of ancient buildings. Many beautiful monuments of the piety and taste of the olden time have lately been rescued from decay by individual exertion; but it is now absolutely necessary, that immediate steps should be taken to raise a general fund, to be applied according to the discretion of a committee, to the preservation of such churches, or other ancient edifices, as are valuable for their architectural beauty, or as national memorials. Many of our finest old parish churches, the present neglected state of which is disgraceful to us as a nation, are so circumstanced as to make the preservation of their beauties by any other

means impossible. Every year increases the evil, and none but those who are in the habit of examining country churches can tell how much has been done in the last few years, towards sweeping away from our villages whatever was interesting or beautiful in these ancient structures. The note of alarm was first sounded, *ten years ago*, by an able writer in the *British Critic*. He gives a list of churches which deserve the most careful preservation, and which are, or lately were, unrepaired or ill-repaired to a very great extent. From this list I will make a few extracts, adding examples which have come under my own observation. In Bedfordshire, Dunstable Priory is in great want of repair: of Luton Church, Rickman says that "it has been a rich and beautiful specimen, but is now sadly dilapidated and disfigured in the ornamental parts." In Derbyshire, the stonework of Chesterfield Church is in very bad condition. The once splendid east window of Dronfield Church is stripped of its tracery, and partly bricked up. Bebbington Church in Cheshire, a beautiful composition, is rather dilapidated. Trinity Church, the Ladye Chapel of Ely Cathedral, is in very great want of exterior repair. In Gloucestershire, Cirencester Church has a fine porch, much decayed. Elliston, a curious Norman relic, is also perishing for want of attention. The large church of Romsey, in Hampshire, is very much out of repair. In Lancashire, the east window of Holland Chapel, a very fine specimen of the early decorated, has been unsafe for many years; and the chancel window of Winwick has lost all its tracery, once very fine. Lincolnshire formerly contained more magnificent churches than any other county, and the devastation has been proportionably extensive. Ravenby and Leadenham, two very fine churches, have lost their tracery, and are losing their stonework. At Ripingale, part of the south aile is used as a schoolroom: here are two very fine tombs with effigies, which are subject to continual mutilations. At Heckington, one of the richest and most valuable churches in the county, the tracery of the north transept window has been destroyed. The west front of Crowland, which Rickman styles one of the most beautiful portions of rich early English in the kingdom, is in such a state, that a very slight fall from above would entirely destroy it. The fine church of Higham Ferrers, in Northamptonshire, has lost much of its stonework. In Oxfordshire, the windows of Adderbury have been deprived of their fine tracery; and the curious church of Barford is much decayed. The windows of Tamworth have lost their tracery. In Warwickshire, the stonework of the two splendid spires of Coventry is sadly decaying. In Yorkshire we have Headon despoiled of tracery; Howden Chancel, one of the most elegant decorated buildings in England, in ruins; Selby, Old Malton, and St. Michael, Malton, in a miserable state. To these may be added, Llandaff Cathedral

in ruins; part of St. David's in ruins; east end of St. Alban's in ruins; the large cruciform church of All Saints, Pontefract, in ruins; Bridlington, once as fine as Beverley, now presenting a melancholy picture of mutilation. The grand east window of Hawton, Notts, is falling to pieces from the decay of the stone-work. But it is needless to proceed with this enumeration, to which every reader could add many similar examples. The destruction of painted glass has been so general, that except a few wretched fragments, it is now seldom seen in village churches; and the numerous coats of arms, often so useful in determining points of family history, have perished. In Devonshire, a few years since, few churches were without a rich screen and pulpit; but now many have fallen. I would also mention the disgraceful condition of the cloisters and chapter-house at Westminster, and of many of the finest monuments in the Abbey. How long are the splendid tombs of queen Eleanor, of Edward III., of Henry III., with the neighbouring screen, and (with the almost solitary exception of the tomb of Aymer de Valence) nearly all the monuments of early English and decorated date, with their beautiful canopies and rich sculpture, to be suffered to moulder away in the very centre of the wealth and refinement of the kingdom? Let it not be said of us, that the noble and costly structures, in which our forefathers in past ages worshipped God, have been suffered to perish by our neglect, and that we, their descendants, so far from emulating these glorious works, want even the taste and spirit to preserve them from ruin. There have lately appeared some symptoms of a better feeling; and there wants but the establishment of a society as I have suggested, to embody and increase it. If but a few hundreds were annually raised, this would rescue from decay every year some beautiful remnant of our national architecture. Let clergymen in every part of the kingdom be invited to report on the state of their churches, and where the parishioners are willing to come forward to the extent of their ability (as is almost everywhere the case), let a grant of money be voted by the society to assist them in the work of restoration. In this manner, many a beautiful window, screen, niche, font, canopy, &c., would be preserved from decay; and their preservation would have a most beneficial influence upon the national taste, and promote the revival, upon true principles, of English architecture. I have trespassed upon your indulgence to a length which nothing but the importance of the subject could warrant; and most sincerely do I hope to see the matter taken up by those who have displayed such praiseworthy zeal in particular instances, and whose knowledge and influence would insure success.

January, 1838.

ART. V. *An Account of an immense Chimney, recently built at Carlisle; with Suggestions for applying Chimneys or Cones, of immense Height, to scientific Purposes.* By P. A.

"THE immense chimney attached to the new cotton factory, now being built for Messrs. Peter Dixon and Sons, in Shaddongate, had the last stone placed upon it on October 24. 1837. It is one of the highest buildings in England, being 305 ft. from the ground; and, for the purpose to which it is to be applied, is understood to be the highest erection in the world. It may be distinctly seen for many miles in all directions around Carlisle, and forms a beautiful object in the view of our city, from which ever quarter you approach it. The building is of the octangular form, and is built with brick, the angles being formed of stone. The base, which is built with fire-bricks, is 17 ft. 8 in. in width inside, and the thickness of the wall at the foundation is 10 ft. It tapers upwards to a width, inside, of 6 ft. 3 in.; and on the outside 8 ft. 9 in. Near the top there is a cornice of stone, 7 ft. in depth, which projects 3 ft., and above this there are 8 ft. 3 in. of brickwork, surmounted by a coping stone, one foot in thickness. The cornice gives a finished and classical appearance to the building; and the whole would be taken for some splendid national monument, rather than a mere conduit pipe for smoke. It is not a little creditable to Carlisle, that this magnificent work was entirely executed by a native of that city, a builder, Mr. Richard Wright, who has completed it in a way to give the most entire satisfaction to every scientific man who has examined it. Considering its immensity, the work was completed in an incredibly short period of time. The foundation stone was laid on Sept. 11. 1835, by P. Dixon, Esq.; the first brick was laid by Mr. Wright, on Sept. 17.; the last course of bricks, also by Mr. Wright, on Oct. 22., and the last coping stone on Oct. 25. 1836; thus completing the work in thirteen months. The erection was carried on from the inside, stages being erected as the work proceeded, and the workmen and materials being taken up in boxes prepared for the purpose, by a crab worked by four men; and it is gratifying to add that the whole was finished without any accident occurring to any individual engaged in it.

"As the work approached conclusion, numbers of people expressed an anxiety to have a peep from the top. In order to gratify the public curiosity, the Messrs. Dixon ordered a box to be prepared, and the necessary arrangements to be made to accommodate as many as might choose to ascend. The workmen finished their labours about noon; and, the day being very clear, although very windy and extremely cold, numerous parties ascended in the course of the afternoon, and this accommodation was continued for a few days. The box was calculated to hold four persons, three visitors and a guide, who had been accustomed to ascend the building. A door opened on each side of the box, to admit the passengers, and was then locked, and the word being given, it slowly ascended to the "upper regions," a process which occupied about fourteen minutes. When within a few feet of the top the box passed through a trap door, which immediately fell down again, and thus afforded a secure landing place. From this the ascent to the top is by two ladders of about 7 ft. each, and as the visitor rises upon the last platform the most magnificent sight imaginable bursts upon the view. The city lies at his feet, with all its winding streets clearly and distinctly seen as upon a map; and the huge factory itself, to which the chimney is but an adjunct, looks like a building of some two stories in height. It forcibly illustrates Shakspeare's description of the appearance from Dover cliffs:—

——— 'How fearful
And dizzy 't is, to cast one's eyes so low!
The crows and choughs that wing the midway air
Show scarce so gross as beetles: half-way down

Hangs one that gathers samphire; dreadful trade!
Methinks he seems no bigger than his head:
The fishermen that walk upon the beach
Appear like mice: and yon tall anchoring bark,
Diminish'd to her cock; her cock, a buoy
Almost too small for sight.'

"The view of the country around is most extensive and picturesque. The spot on which the chimney stands seems the centre of a huge amphitheatre, to which the horizon forms a circular boundary. Rich and fertile valleys, intersected with farm-houses and the seats of country gentlemen, and with the rivers winding, like streaks of silver, in the most beautiful curves, lie extended in such extent and variety, that the eye for a time is bewildered by the number of objects presented; whilst the mountains rise pile above pile on each side, like walls surrounding the mighty area. On the west side might be seen the estuary of the Solway, with vessels taking their departure from Bowness; and on the other, the locomotive engines careering along to the opposite side of the island, carrying with them to the east tokens of the wealth and enterprise of the west. Altogether a sight more enchanting and exhilarating can scarcely be conceived. On Oct. 24. the thermometer at the bottom of the column stood at 41° in an exposed situation; at the top of the column, exposed in the same aspect, it was at 38°." (*Carlisle Journal*, Oct. 29. 1836.)

Soon after I read the above account, I fancy I fell asleep; but whether awake or asleep, as I sat by my fire, the following thoughts came into my head, which I hope you will not set me down as unpardonably foolish for communicating to you. I thought the British Association had grown enormously rich (as it is to be hoped they will); that they had money at command to spend upon every great object for the advance of science; and that, amongst others, it had been determined to erect a tower, or chimney, five thousand feet in height, to be wholly devoted to the purposes of scientific research or observation. It was conceived, that by having a tower of this height, with easy access to its summit, many problems in meteorology, electricity, terrestrial magnetism, and astronomy, &c., might be solved at once, which can now either be only arrived at circuitously or not at all. It seemed that the designs were complete; and that nothing more was required, but to choose a site, where a foundation sufficiently good, and abundance of material, could be procured. One of the coal districts was chosen, where there was foundation on the solid rock; clay, to make bricks; sandstone and lime in abundance; and coal to be used in making the bricks, dressing the stones by steam power, and elevating them on the lofty summit by the same.

The general form was to be conical, and a floor with a circular aperture was to be placed at every 500 ft., while by suitable machinery a stage could be elevated to the summit from below, or lowered again with people or instruments, in a few minutes.

The lower part was to be made of stone, and the upper of brick; lest if all be made of the latter, the upper might crush

the lower part with its weight. I thought I heard that the first experiment was to be, to repeat that made in St. Paul's, of letting a body fall so as to prove the rotation of the earth; and that in this case, some other important deductions could be made from the experiment.

It seemed to me, at first, that a high mountain would answer all the purposes of the tower; but, on reflection, I soon saw this was not the case. Now, my reverie, or dream, as such things generally are, was rather confused and indistinct in some places; but I was so much struck with a sort of vein of sense or reality which ran through the whole, that I determined to give you an account of it; and would be much obliged for my own information, and that of other country readers like myself, if you or some of your intelligent and scientific correspondents would consider, and say whether such a tower could be built; and, if so, would it really have any scientific uses? and, if both, what would be the detail of its construction and its cost? Surely *a company* could be got up to build it, if it could be shown to be of use: and how grand a national monument it would be! In an economical point of view, it would pay by showing people the view from the top, at so much a head.

I hope, because I have sent you the above speculation, you will not consider me bereft of my wits. The idea is not intended as any covert attack upon the British Association for the Advancement of Science; far from it: on the contrary, I seriously do believe, that, if such a tower, cone, or pyramid, could be accomplished (but this, I fear, is out of the question), its scientific uses would be many and great; at all events, the novelty of the idea will, I trust, set some of your correspondents to work, to consider the means of carrying such an idea into execution; and, in this view, the problem which I have proposed may prove neither useless nor uninteresting.

Belfast, Jan. 29. 1838.

ART. VI. *A Stove on a new Construction, for heating any large Apartment, or the House of Commons.* By R. MALLET.

I SEND you a sketch (*fig.* 72.) of mine for a new stove, to heat a great hall, library, or drawingroom, of a palace or other large edifice. The stove is intended for a large party to sit round; and its objects are not only to warm to the best advantage, but to look warm; and at the same time to ventilate effectually, without causing those drafts of air at the back, which are so miserably felt at our common fires.

This stove is intended to burn charcoal, coke, or anthracite,

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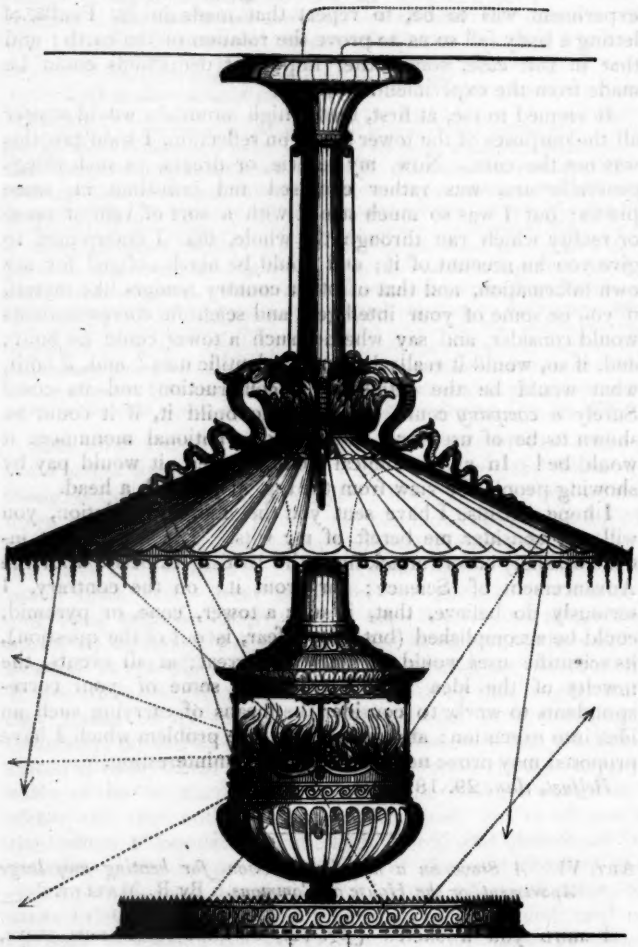

or wood, or turf, or, with certain precautions, even coal. It is placed in the centre of the apartment. The lower part consists of a sort of open cage, to hold the fuel, with a close top or dome over

it, communicating with a cylindrical vertical flue, proceeding to the ceiling. It rests upon a single stud below, and is strongly fastened above, so as to be a in great measure suspended. The floor of the room beneath it, for about 8 ft. in diameter, consists of a polished plate of cast iron, surrounded with a perforated ornamental ring-fender. In the centre of this plate, and communicating with an air-flue in the floor, is a large ventilator for supply of air to the fire. Above the fire cage, or "focus," is a conical hood, suspended by two slight chains parallel to the flue, and having a hollow cylindrical balance-weight inside of it, to which the chains are attached; they pass over two small pulleys, where they enter the sides of the flue above.

The draft, or smoke, of course, passes through this hollow cylindrical weight. Thus the hood is enabled to be slid up and down for a certain space. When at the lowest, it is so placed, that a short tube, which forms its centre and grasps the flue, covers completely certain openings or slits therein; but, when it is thrown up about 18 in., it uncovers them.

The vertical flue passes along horizontally above the ceiling, in the thickness of the floor, to the side flue in the wall, where such is a convenient arrangement, care being taken to guard against fire.

The hood is proposed to be made of sheet brass or sheet steel, and polished or burnished inside. Now, the working of the stove is thus:—The situation, as to height of the "focus," is so arranged, and its own form so made, that as large a quantity of heat, or rather as great a number of rays of heat, shall reach the polished iron plate beneath, as possible. These are all thrown upwards and outwards at various angles, as shown in the sketch. In the same way the angle, diameter, and height of the conical hood are made such, that the largest possible number of rays shall reach it also from the "focus;" and these are either reflected downwards and outwards directly, or reflected against the lower plate, where they pass outwards by a second reflection. Now, as the form of the cage, or "focus," is circular, almost the whole of the radiated heat is made effective, either directly, or after one or two reflections.

So much for heating; now for ventilation. The fuel, it has been said, is supplied by an air-flue from below. Over the architraves of the windows are long slits, opening and shutting, and admitting fresh air, which, when the hood is at the lowest, diffuses itself through the hot air, and finds its way at last to the fire, at least in part; but, when more ventilation is desirable, the hood is thrown up, when, at once, not only the rays of heat are thrown further out, beyond the sitters round, and more diffused, but the slits into the flue are opened beneath the hood,

when immediately a current of air begins to flow in under its edges, and is collected and drawn up the flue; but at such a height as to be above the heads of the sitters round, while the rays of heat, now shed far outside them, shield them from any draft of cold air, like an invisible ægis. If the ventilator of the air-flue now be shut, the ventilation of the apartment is the greatest possible.

The upper and lower parts of the "focus," it will be seen, are united only by four rods of iron: it may be all made of cast iron, and richly ornamented, and must be provided with four sheet-iron segmental blowers, to urge the fire with at first, until the draft is established, or they may be of talc, and permanently hung to the cage. The draft will require to be good and sharp; but with that there will be no danger of dissipation of smoke or vapours. The flue may be of sheet iron, with a covering of fluted and polished brass; the hood, and indeed every part of it, is susceptible of being gorgeously ornamented in bronze and gilding, &c.; and would afford an august style of ornament for a great room, and permit the greatest possible facility for conversation with comfort. The usual dimension of the hood should not be less than 8 ft., and its height from the ground about the same. It is usually considered that, of the heat of a hot body in free air, one half is lost by radiation, and the other by "evection," or carried off by currents of air. Now, in the common fire-places, as only one side is exposed to radiation, only one fourth of the whole heat can ever be available, and the average heat obtained from house fires has been estimated as low as only one twentieth of that given out by the fuel; but, in this case, nearly all the radiant heat, or one half the whole is effective, and a larger portion of the "evective" heat, by subsequent radiation and conduction from the flue. The inside lining of the hood may be made partly hyperbolic, as shown in *fig.* 73., to throw the heat outwards the better.

It will be observed, that the ventilation of the apartment is here carried on above the heads of the persons present, as it always should be. By a simple addition, the hood may be made to rise and fall by a self-acting apparatus, so as to keep the apartment at a constant temperature. The proportions of heat radiated by combustible bodies in burning, to that carried off by "evection," varies in every body, and has been found a maximum in coke and turf; these, in consequence, would be the fittest fuels for this stove. Berthier has given us some very valuable information on this point.

Perhaps a gigantic stove of this sort, placed in the centre of a horse-shoe building, like the French Chamber of Deputies,

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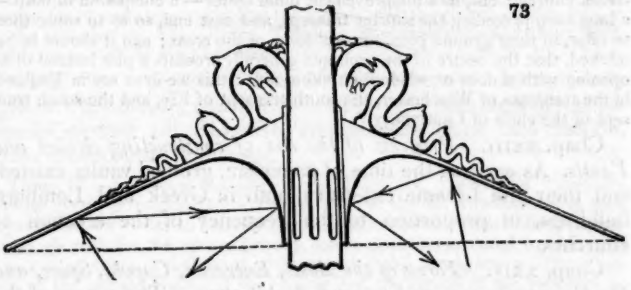

and with a hood equal to one half the diameter of the building, would be the best and most sightly mode of warming and ventilating the new Houses of Parliament, which seems to be a very puzzling problem to those concerned. It might be so contrived as in no way to interrupt the view in any direction; and might be made to have an *Athanor*-like addition, so as to hold twenty-four hours' consumption of fuel, to be gradually consumed. Of course, the form I have shown is only one of a thousand far nobler and handsomer, that might be given to the apparatus, preserving still its principles of action.

Dublin, Feb. 1. 1838.

REVIEWS.

ART. I. *An Historical Essay on Architecture.* By the late Thomas Hope. Illustrated from drawings made by him in Italy and Germany. Royal 8vo, 2d edition. London, 1835.

(*Continued from* p. 532.)

"IN Lombard buildings the whole of the strength requisite for support and resistance is sought in the general thickness of the wall, or in the facings that slightly project from it, or in columns leaning against it; seldom we see even solid buttresses very prominent, and I believe the flying buttress to exist nowhere in this style. The Lombard, or what we call Saxon, buttresses are shallow, broad, shelving upward in regular breaks, and quite unornamented, except by some billet or other moulding that runs from the intervening panels uninterruptedly across them; from their shallowness they seem intended rather for mere ornament than for strength and support.

"The arch is in general round-headed. Sometimes, however, we see in buildings, which, from their general style, we must call Lombard, intermixed with the round-headed arch, and evidently of the same era, but, as a mere variety from it, arches flattened: as in the exterior of the dome at Modena; the side altars of St. Apollinaire in Classe, at Ravenna; the chapel of Barbarossa's palace at Gelnhausen; and Barfreston church in Kent: or arches with two straight sloping sides, meeting at an angle, as at Rome, on the south side of Santa Maria in Trastavere."

"The Lombard churches, in general, present neither the simple oblong square of the basilica, nor the cross, with four short and equal ends, of the

Greek church: but, as an improvement upon either — a compound of both — a long nave preceding the shorter transept, and east end, so as to cause them to offer, in their ground plan, the real form of the cross; and it should be remarked, that the centre of the transepts generally presents a pier instead of an opening with a door or window on either side: this we even see in England, in the transepts of Winchester, the south transept of Ely, and the south transept of the choir of Canterbury."

Chap. XXIII. *Progress of the Art of constructing Arches and Vaults.* As early as the time of paganism, groined vaults existed, and their use became extensive both in Greek and Lombard buildings, in proportion to the frequency of the erection of churches.

Chap. XXIV. *Forms of the Absis, Entrance, Cupola, Spire, and Steeple, usually seen in Lombard Architecture.* The centre of the east end or sanctuary generally ended in a semicircular absis or, at times, also the ailes were made to end in absides. In some of the cathedrals in Germany, there is no entrance at the west end, but only at the side. In Lombardy, the crossing of the nave and transepts generally rises into an octagonal cupola In Germany, in the cathedral of Worms and others, the cupola becomes a pyramidal mass or a spire.

"As the species of architecture here described arose in a country where snow lies little on the roofs, these were generally low and flat, and under them frequently runs a gallery of small arches and pillars, which, along the sides, forms a frieze; round the absides and cupola, a belt; and up the gable end of the front, a slanting line of steps, exceedingly elegant, singular, and, by the smallness of its parts, increasing the apparent magnitude of the whole; witness San Giovanni and Paolo at Rome; the domes at Parma, Piacenza, Modena, Vercelli, and Arezzo; the Certosa near, and San Michele at, Pavia; San Fidale at the town, and Gravedone on the lake, of Como.

"The small galleries, however, running up the pediment, are a very remarkable feature, entirely confined to Lombardy. Instances of these galleries under the roof and round the absides, &c., may be seen on this side of the Alps. In the cathedrals of Vienne in Dauphiné, of Spire, Worms, Mayence, and Aix-la-Chapelle; in the Apostles, and St. Gereon, at Cologne; St. Castor, at Coblentz; and Sainte Croix, at Liege.

"As soon as you reach Germany, the roofs become, as they should in a country more northern, higher and steeper; and thence the small gable ends, forming pediments, of which I only remember one example in Lombardy — at Verona, in the absis of San Fermo — become more frequent."

"When, from points very distant, the faithful were to be called at some appointed hour to some assigned place of common prayer and worship, not only the clear and powerful sound of bells was deemed best calculated to convey the distant summons, but, in order that their radiating vibrations might be less impeded in their diffusion, slender but lofty edifices, called steeples, were built, for the sole purpose of lifting high in air the receptacles of these bells. It is difficult to ascertain where, and when, bell-towers first arose — probably at Constantinople. Anastatius Bibliothecarius mentions Pope Stephen III. as having first added one, containing three bells, to St. Peter's. That of St. Mark at Venice was begun in 902; though, in 1131, only finished to the bell-house; that of San Zeno at Verona, begun in 1045, was finished in 1178; and the great tower in the Piazza at Verona was commenced in 1172.

"Neither belfries nor baptisteries were considered as essential parts of, or embodied with, the church. On the contrary, like the baptistery, the steeple was placed at some distance from the house of worship.

"The severity of the climate beyond the Alps probably was the original motive for immediately connecting the steeple with the church on one side, as in the cathedral at Angoulême. The love of symmetry caused them, afterwards, to be built in front of these."

Chap. xxv. *Lombard Monastic Architecture.* In the early ages of Christianity, churches were the only buildings of consequence erected till Christian communities came into fashion, when monasteries were built.

These, like all private buildings in mild climates, consisted of "a square internal court, surrounded by a cloister, open to the air, which served at once for exercise, for coolness, and for communication between the different apartments, all made for the sake of privacy, before glass was invented, to look from the road or street to that court within; and if this arrangement differs from that of the private houses of the present day, the reason of the variation is, that while monasteries have during every age, in every latitude, remained the same, the form of private dwellings has experienced considerable changes. . . . The earlier cloisters of the Latin church are all in the Lombard style."

(*To be continued.*)

ART. II. *Mechanics of Fluids for practical Men, comprising Hydrostatics, descriptive and constructive: the whole illustrated by numerous Examples and appropriate Diagrams.* By Alexander Jamieson, LL.D., Author of "Elements of Algebra," &c.

"THIS volume is not a selection of shreds and patches garbled from contemporary authorities: but a systematic treatise on Hydrostatic Science, containing a vast mass of valuable and interesting facts, combining indeed almost all that needs to be known on the equilibrium of fluids. But for the convenience of reference, these mechanics of fluids are distributed into a series of chapters, whose titles indicate the several topics that receive mathematical demonstration. The first of these contains, besides a few brief but necessary definitions, the fundamental proposition upon which all the problems that are drawn up in elementary hydrostatics are in reality founded.

"The principle established in the general proposition enables the reader to proceed in the second chapter with the pressure of incompressible fluids upon physical lines, rectangular parallelograms considered as independent planes immersed in the fluid, and to determine the position of the centre of gravity of the various rectangular figures which the successive problems embrace, together with the pressures of fluids upon the sides and bottoms of cubical vessels, with the limits which theory assigns to the requisite thickness of flood-gates."

In this manner, a general analysis of the book is given in the Introduction, from which, and from the high reputation of the author, we should say that the work is one which ought to be in the possession of every civil engineer. The subject that we were most interested in, in looking through the work, and also that on which we were best able to form a judgement in a practical point of view, is the chapter "Of the pressure of non-elastic Fluids on Dykes and Embankments." See our article Embankment in the Supplement to the *Encyclopædia Britannica*, 6th ed. The subject of floatation, and of the centre of gravity of bodies floating in water, is also treated in a very satisfactory manner, and illustrated by numerous well executed engravings on wood.

Chap. XIV. treats of the centre of pressure, and to this are appended the following very interesting notes, on the subject of Artesian wells.

"Upon the pressure, cohesion, and capillary attraction of fluids that are heavy, depends their transmission through fissures of the earth and between its strata, which are pervious to the percolation of water. We can penetrate but a small distance, say 500 fathoms, in digging for coal; a less depth suffices for some ores, and water is found at all depths, from a few feet to three hundred, as in the neighbourhood of London. In the great coal area of Britain, extending lengthwise 260 miles, and in breadth about 150 miles, in a diagonal from Hull to Bristol in England, and from the river Tay to the Clyde in Scotland, we find a great variety of rocks of strata, piled up at a small angle, with the horizon, though in some instances, like the primitive, nearly vertical. These strata consist of sandstone, clayslate, bituminous slate, indurated argillaceous earth or fireclay, argillaceous ironstone, and greenstone or blue whinstone: and, to possess the valuable treasures concealed among these rocks, we employ a vast capital in money, and tax all the ability of the human mind in the science of engineering.

"To bring the subject-matter of capillary attraction, as regards Artesian wells, springs, mountainous marsh lands, or bogs, fairly before the reader in a very brief manner, we shall avail ourselves of a vertical section of the strata in Derbyshire, selecting our materials from the valuable work of Mr. Whitehurst, '*On the original State and Formation of the Earth.*'

"If the reader conceive the alluvial covering to be removed, the strata will at once appear on the upper surface, as in the external contour of the country between Grange Mill (s) and Darley Moor over number 1 and 2, in Derbyshire. Let now the numbers 1, 2, 3, 4, &c., represent the strata in their vertical position, basseting towards (s), with the river Derwent running over a fissure filled with rubble in the centre.

"Then the upper stratum, or No. 1., at Darley-Moor, is *Millstone Grit*, a rough sandstone, 120 yards deep, composed of granulated quartz and quartz pebbles, without any trace of the animal or vegetable kingdoms.

"The next stratum, called No. 2., which descends to the Derwent, is a bed of *Shale*, or *Shiver*, 120 yards deep, being a black laminated clay, much indurated, without either animal or vegetable impressions. It contains ironstone in nodules, and the springs issuing from it are chalybeate, as that at *Buxton Bridge*, or that at *Quarndon*, and another near *Matlock Bridge*, towards *Chatsworth*.

"Next in succession we have No. 3., *Limestone*, 50 yards thick, productive of lead ore, the ore of zinc, calamine, pyrites, spar, fluor, cauk, and chert. This stratum is full of marine debris, as *anominæ bivalves*, not known to exist in the British seas; also *coralloids*, *entrochi* or screw stones; and amphibious animals of the saurian, lizard, or crocodile tribe; some of which in a fossil state are of enormous size.

"Following this we have No. 4., a bed of *Toadstone*, 16 yards thick, but in some instances varying in depth from 6 feet to 600 feet. It is a blackish substance, resembling lava, very hard, with bladder holes, like the *scoria* of metals or Iceland lava. This stratum is known by different names in different parts of Derbyshire. At Matlock and Winster it is *toadstone* and *blackstone*; at Moneyash and Tidswell it is called *channel*; at Castleton, *cat-dirt*; and at Ashover, *black-clay*. This *toadstone*, *channel*, *cat-dirt*, and *black-clay*, is actually *lava*, and flowed originally from a volcano, whose funnel or shaft did not approach the open air, but which disgorged its contents between the (adjacent) strata in all directions, at a period when the limestone strata and the incumbent beds of millstone-grit, shale, argillaceous stone, clay, and coal, had a uniform arrangement concentric to the centre of the earth.

"Beneath all these we have No. 5., a *Limestone* formation, 50 yards thick, and similar to No. 3.; that is to say, laminated, containing minerals and figured

stones. It is productive of marble; it abounds with *entrochi* and marine exuviæ; it was thence at one time the bed of a primæval ocean.

"No. 6., is *Toadstone*, 40 yards deep, and similar to No. 4., but yet more solid, showing that the fluid metal was more intensely heated and combined than No. 4.

"No. 7., *Limestone*, very white, 60 yards deep; laminated like Nos. 3. and 5., and like them it contains minerals and figured stones, and was either a continuation of Nos. 3. and 5., the entire mass having been split at different depths by the expansive power of the boiling lava.

"No. 8. is *Toadstone*, 22 yards deep, similar to No. 6., but yet more solid.

"No. 9. *Limestone*, resembling Nos. 3. 5. and 7.

"To this enumeration of the Derbyshire strata we must now add six other strata; too minute to be expressed in the same scale, but which are in fact the *capillary strata*, which we may liken to the glass plates referred to in Problem 71. Miners call these minute parallel strata, *clays*, or *way-boards*; in general they are not more than four, five, or six feet thick, and in some instances not more than one foot. They are the channels for water, and all the springs flowing from them are warm, like those at Buxton and Matlock Bath. The first stratum of clay separates Nos. 3. and 4.; the second, Nos. 4. and 5.; the third, Nos. 5. and 6.; the fourth, Nos. 6. and 7.; the fifth, Nos. 7. and 8.; the sixth, Nos. 8. and 9.: and what is very remarkable, by these clays the thickness of the other strata may be ascertained, which would otherwise be difficult, as the limestone beds consist of various *laminæ*.

"In other districts in Britain, we find that the coal formations sometimes repeat, in precisely the same order, and in nearly the same thickness, the following earths and minerals: sandstone, bituminous shale, slate clay, clay iron, stone, coal; or the coal is covered with slate, trap, or limestone, or rests upon these rocks. The strata generally follow every irregularity of the fundamental rock on which they rest; but in some instances their directions appear independent, both of the surface of the rock, and of the cavity or hollow in which they are contained, and in general take a waved outline, seldom rising greatly above the level of the sea.

"We have now, however, merely represented the general arrangement of the strata; not all the particular circumstances accompanying them, with respect to their several fractures, dislocations, &c.; but it will enable us to reason upon the chemical effects of water upon limestone and gypsum rocks, where we meet with caverns, caves, and extensive fissures, that reach sometimes to the surface, sometimes dip to a greater or less distance, and afford channels for great springs and subterranean rivers. These caves in the gypsum and chalk formations vary in magnitude from a few yards to many fathoms in extent, forming upon the surface of the ground, when their superincumbent roofs give way, those funnel-shaped hollows of such frequent occurrence in gypsum districts. The limestone strata, besides being 'loaded with the exuviæ of innumerable generations of organic beings,' says Dr. Buckland, 'afford strong proofs of the lapse of long periods of time, wherein the animals from which they have been derived, lived, and multiplied and died, at the bottom of seas which once occupied the site of our present continents and islands.'* With how much reason then may we not suppose those formations to have held large beds of rock salt, which the percolation of water, in the lapse of ages, removed, and left the chambers empty, or the receptacles of meteoric water. The percolation of water through felspar rocks must of necessity wash away the alkaline ingredient, which combining with iron will form hydrate, or by its decomposition oxidate the metallic substance. Hence result chalybeate, acidulous, sulphureous, and saline springs, all the result of capillary attraction in the strata of the earth, and the disintegration by water of the various ingredients which the universal solvent holds in a state of fluidity.

"Supposing these cavities, to which we have just referred, to have been

"* Dr. Buckland's Bridgewater Treatise, 1st ed., vol. i. p. 112—116.

freed from their original salt deposits, by water percolating the fissures leading to and from the masses of salt, we trace the operation of salt springs. For in all cases in which water holds any mineral in solution, it acts by combination, but where it simply destroys the mineral aggregation, the mineral falls into small pieces with an audible noise, as is observed in *bole;* or it falls without noise into small pieces, which are soon diffused through the fluid, without either dissolving in it or becoming plastic, as in *fuller's earth*, and some minerals, as unctuous clay; it renders plastic other minerals, absorbs water in greater or less quantity, by which their transparency, and also their colour, are changed.

"The toadstone, which intersects mineral veins, totally cuts off all communication between the upper and lower fissures, and by the closeness of its texture permits not the water in the clay strata, or *way-boards*, to filtrate. Hence toadstone is said to be capable of turning water, as we have shown in the shaft and gallery o a u g. Sandstone strata, of an open porous texture, becomes a great feeder of water. Several of the sandstones are, however, impervious to water, and almost all the beds of light-coloured argillaceous schistus, or fine clays, are particularly so, being very close in their texture. But the percolation of water at the beds or partings of two strata is an occurrence so general, that our wonder ceases when examining parts of the country where the strata basset or shoot to the surface in an acute angle, to find the alluvial covering in places swampy, marshy, and overrun with puddles, springs, and all that species of soil, which, being damp and cold, subjects its inhabitants to rheumatism, agues, and a train of diseases, unknown in regions that are not incumbent on the extremities of way-boards and capillary strata. The source or feeder of these subterranean capillaries receiving a constant supply, keeps up the train of human ills from one generation to another, while local interests or associations bind the natives to their hereditary doom.

"Capillary attraction and cohesion, besides expounding the phenomena of fluid ascent in strata of earth, direct us in penetrating those troublesome quicksands and beds of mud, which in the winnings of collieries are met with in mining, and where cast-iron tubbing is employed to support the sand or mud-bed, and carry the water down to the bottom of the pit.

"Water stands higher in narrow than in wide glass tubes, but quicksilver mounts higher if the inside of the tube be lined with bees-wax or tallow. We can easily conceive that the lateral action may yet cause the perpendicular ascent; for it is a fundamental property in fluids, that any force impressed in one direction may be propagated equally in every other direction. Hence the affinity of the fluid to the internal surface producing the vertical ascent. A drop of water let fall on a clean plate of glass spreads over the whole surface, in as far as there is liquid to cover the glass, the remoter particles extending the film, yet adhering with the closest union. The adhesiveness of fluids is still more clearly shown in their projection through the pores of minerals, plants, animals, gravel, earth, and sand. Water rises through successive strata of gravel, coarse sand, fine sand, loam, and even clay: and hence, on the sea-coast, those quicksands, which have engulfed armies and ships, the pressure of the ocean at flood sending its advanced column up in the sand to a level with its surface a mile at sea. Gravel divided into spaces of the hundredth part of an inch, will allow water to ascend above 4 in.; it would mount up through a bed of 16 in. of this material, supposing sea gravel to be the 500th part of an inch. Fine sand, in which the interstices are the 2,500th part of an inch, allow the humidity to ascend 7 ft. through a new stratum; and if the pores of the loam were only the 10,000th part of an inch, it would gain the further height of 25½ ft. through the soft mass. Hence originate marine *syrtes*. Clay would retain the moisture at a greater altitude; but the extreme subdivisions of the clay, which enable it to carry water to almost any elevation, yet make it the most efficient material in puddling or choking up the interstices of masonry.

"The ascent of water in a glass tube is due chiefly, we think, to the excess

of the attractive power of the glass above the cohesive power of the fluid mass over itself. Were the attractive and cohesive forces equal, the fluid would remain balanced at a common level. Mercury hence sinks, by reason of the strong cohesive power of its own particles. Hence we account for mercury closing over a ball of crude platinum, which, nevertheless, being gently laid on the mercury, will float, although its specific gravity is above that of mercury.

"It is, however, the province of chemistry, rather than of mechanics, to measure the cohesive power possessed by different fluids, or by the same fluid under different degrees of temperature.

"The suspension of water in any stratum through which it can percolate, must depend entirely upon the smallness of the upper orifice, or superficial extent of the deflection with which the stratum slopes off horizontally above ground and upon the relative elevation of the extremities of the impervious stratum. Thus, suppose *a* and *b* (*fig.* 74.) to be two extremities of a stratum pervious to water; the central column of water at *c* is pressed with the whole weight of the space *b c*, and this pressure upon *c a* pushes the fluid out at *a* by the excess of force in *b c* above that in *c a*; and therefore, while the ground or land at *b* is generally dry, that at *a* is perhaps boggy; at all events it will exhibit springs at its surface, be cold, damp, and its inhabitants subject to rheumatism or agues. A column of water of this description may occupy a space of many miles extent between *b* and *a*; and *c* may be many hundred feet deep below the horizontal level of *a*. In digging for water at *d*, we should find it at *c*.

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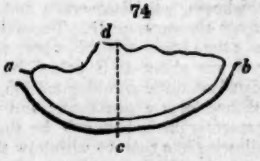

"The cohesion of the particles of water, and its extreme facility to obey any impression, fit it admirably for percolating through fissures of the earth, when in the tenderest filaments it is detached from the general fluid mass, and penetrates only by the laws of capillary attraction from one point to another in an extensive stratum of clay, precisely as if it flowed through a pipe in passing from one hill to another. Hence the certainty with which we meet with water in boring to a proper depth in the earth, and hence also the origin of Artesian wells, which finely expound the varied phenomena of a retreating and subsiding column towards the body of the fluid, as if an equal and opposite pressure from the sides of a capillary tube had come into action. We may hence infer that, in strata pervious to water, the capillary ascension, however much it may be accelerated or retarded by the parallel sides of the stratum and the material of which it is composed, is governed by these three principles which we have fully discussed, pressure from above, cohesion subsisting among the particles of the liquid, and attraction of the parallel sides of the stratum. Were this attraction equal to the antagonist cohesion, the fluid would remain at rest, balanced at a common level, till overcome by the weight of the contents in the longer branch of the fluid column forcing the contents of the shorter column out at the discharging orifice. All the springs which are below the London clay, at the depth of 150, 200, 250, or 300 feet, are fed by sources considerably elevated above the Hampstead level. With what ease then might the metropolis be provided in every street with fine spring water.

"'In the year 1791, the vicar of Northall (Mr. Archdeacon Eaton) agreed with Mr. White of Putney, to sink a well in the court adjoining to the vicarage.

"'The workmen first dug through a bed of solid blue clay, 60 ft. in depth; under which was a stratum of rough porous stone, about a foot thick.

"'To this succeeded a second stratum of clay (differing a little from the former in colour), 29 ft. in depth; then a stratum of fine grey sand, intermixed with extraneous fossils, as oyster shells, bivalves, &c.

"'This stratum continued for 23 ft., and was succeeded by another of clay of a red or ferruginous colour, less firm in its consistence than that which

occurred before, and intermixed now and then with gravel and stones of a considerable size.

"'After digging through this stratum for 51 ft. (at the depth of 164 ft. from the surface), water was found, which, on the removal of the stone which lay immediately over the spring, burst up with such force, and in such abundance, that time was scarcely given for the signal to be drawn up. Within the first four hours of its discovery the water rose to the height of 80 ft.; and in the next twenty-four hours about 40 ft. more; after which it continued to rise gradually for the next fortnight, till it reached its present level, which is only 4 ft. from the surface of the earth, the depth of the water being now 160 ft.

"'The inhabitants of Northall have free access to this well.'

"'At Munday's brewery, Chelsea, a well was dug, in the year 1793, to the depth of 394 ft., within 20 or 30 feet of the edge of the river, mostly through a blue clay or marl.

"'At the depth of about 50 ft., a quantity of loose coal, about 12 in. in thickness, was discovered; and a little stratified sand and gravel was found about the same depth. The well-digger usually bored about 10, 15, or 20 feet at a time lower than his work, as he went on; and on the last boring when the rod was about 15 ft. below the bottom of the well, the man felt at the first signal of water a rolling motion, something like the gentle motion of a coach passing over a pavement; and upon this he continued to bore; the water presently pushed its way by the side of the auger with great force, scarcely allowing him time to withdraw the borer, put that and his own tools into the bucket, and be drawn up to the top of the well. The water soon rose to the height of 200 feet.' (*Middleton's Middlesex.*)

"'On the west of a small brook which runs by Kilburn and Bayswater, in the parish of Paddington, where the soil is deep clay, the springs lie very far beneath the surface. On the sinking of a well here some few years ago, by Mr. Colson, the workmen dug nearly 300 ft. before they found water. In sinking this well, the workmen dug through a bed of bluish clay to the depth of about 100 ft., when after passing a thin stratum of stone, they came to another bed of clay of the same quality and colour, through which they dug without further interruption till water was found, at a depth of about 300 ft. from the surface. In digging another well in the same neighbourhood, water was found at the depth of 250 ft., which rose with great rapidity till it came within 70 ft. of the surface, after which it continued to rise very gradually a few feet higher, at which height it stopped.'" (p. 463.)

MISCELLANEOUS INTELLIGENCE.

ART. I. *Domestic Notices.*

ENGLAND.

HOUSE-PAINTING.—A very simple method has lately been adopted to render the surface of paint perfectly smooth, and eradicate the brush marks. It is done by a small roller covered with cloth or felt, 8 in. long and 2 in. in diameter, worked in an iron frame on pivots, similar to the common garden-roller. The flatting coat by this method is made beautifully even, and looks exceedingly well. (*Athenæum*, Nov. 4. 1837.)

Two Medals for the Encouragement of Civil Architecture.—A gift for this of 500*l.* has been made to the Society of Arts, by a lady whose name has not transpired. (*Morning Chronicle*, Nov. 15.)

Formation of a School of Design in Manchester.—A short time ago, a number of gentlemen of this town, sensible of the importance of a school of design in this great emporium of art and manufactures, assembled and formed a provisional committee for the purpose of taking the steps necessary to originate

such an institution. At first it was contemplated that it should be a branch of the recently founded school of design in the metropolis; but much disappointment was experienced on finding that there the mechanics were debarred from an equal share in the privileges and studies of the school, and it was ultimately determined that the Manchester School of Design should be a wholly separate and independent institution. At a general meeting of gentlemen favourable to the establishment of a school of design in Manchester, convened by the provisional committee, an animated debate took place. James Heywood, Esq., chairman of the provisional committee, presided, and opened the proceedings. In the course of an excellent speech, he stated that from time to time many efforts had been made by individuals to improve the fine arts in Manchester by their own exertions, and he thought great praise was due to those persons; but very little had hitherto been done by any public body, for the improvement of the arts of design. The Mechanics' Institution had come forward more directly than any other body, having formed classes in several departments of design; as mechanical, architectural, flower, figure, and landscape drawing; and in 1835 the class for mechanical and architectural drawing had an average attendance of 33 pupils; and that for landscape, flower, and figures, of 64 pupils. He hoped these classes would continue to prosper; but what was now wished to be effected was, the formation of a society having for its sole and peculiar object to improve the arts of design, an object sufficient to occupy the whole time and attention of a society with reference to the improvement of those manufactures in which design is required; and also in the education of persons to direct the mechanical powers of this great community. Elsewhere such objects were thought of great importance. Lyons, which rivalled Manchester in many respects, and exceeded it in the taste of its inhabitants in design, had regular schools of design, in which particular attention was paid to the departments of flower and ornamental drawing. When at Lyons some years ago, he had obtained an account of the subjects proposed for prizes in an exhibition, where prizes to the amount of 20*l.* or 30*l.* were given for drawings and paintings. Those subjects were:—coloured drawing, including ornaments, figures, and flowers, in the same composition; groups of coloured flowers; selections of plants, drawn after nature, slightly shaded, of the natural size; the plants separated, so as to exhibit the principal details of flower and foliage under different points of view, not as botany would require them to be exhibited, but as they would be considered most beautiful in art.

Mr. T. W. Winstanley read the following report of the provisional committee:—

"The diffusion of knowledge, in whatever department of science it takes place, is a subject of great interest to every lover of public improvement; and the formation of a school of design, in the town of Manchester must tend to its commercial, as well as classical, prosperity, and must also prove beneficial to the inhabitants of the surrounding towns.

"Manchester, as the great emporium of human industry and production, creates within herself a considerable demand for the decorative and ornamental departments of design, in the operations of calico printing, fancy weaving, and embroidering. Individuals employed in these branches of art require an institution for the improvement of taste, and for the encouragement of harmonious conceptions of beauty in form. Such an institution is equally requisite for students in civil engineering, to whom precision of design, and the skilful use of instruments, in surveying, planning, &c., are essentially necessary in their professional pursuits.

"It has been well remarked, by the Baron Charles Dupin, in his advice to manufacturers, and to the foremen of workshops, that the only efficient means to encounter competition is to manufacture goods really better than all our competitors.

"Superiority in manufacture depends, in a great measure, on the fortunate exercise of taste, economy, industry, and invention. The establishment of a

school of design, in Manchester, is recommended, in order to enhance the value of the manufactures of this district, to improve the taste of the rising generation; to infuse into the public mind a desire for symmetry of form, and elegance of design; and to educate, for the public service, a highly intelligent class of artists and civil engineers.

"Impressed with these views of affording encouragement to the cultivation of the arts of design in Manchester, the present meeting has been called, in the confident expectation, that a society will now be formed for that object, and that the patronage of this influential and wealthy community will not be wanting to the successful execution of a plan which promises so much advantage, both to individuals and to the public."

Mr. J. W. Frazer, in proposing the first resolution, expressed his belief, that not only here, but in other parts of the country, art had for some time made no progress, and that the works of art produced a century ago in England were of a higher grade than those of the present day. Why was this? Because we were more in the habit of copying than inventing.—(Hear, and applause.) Sir Joshua Reynolds had said, that the more conversant we were with the works and compositions of others, the more original would be our own ideas; and that it was only by seeing so little of others, we did so little ourselves. Again, we were fond of any thing by which we could escape that labour of thought — invention; as, for instance, getting hold of one pattern, endless changes were rung upon it; and, out of the thousands of patterns engraved in Manchester for calico-printers, or produced in the loom, there were very few original ideas to be found; for the moment one was started, others caught it up. It should be borne in mind, that the object of this institution would not be to draw patterns, but to qualify persons for inventing them. To give them the power of developing their ideas in drawing, care must be taken as to the mode of instruction. Mr. Fairbairn had told him that young men in his workshop, who could draw very well with line and compass, could not sketch, could not develope an idea. The instruction to mechanics must be of a kind to enable them to sketch with facility, and so to develope their own ideas, or to catch and carry off others when committed to them. Mr. Frazer dwelt on the importance of a study of the human figure, as giving power, and an appreciation of beauty of form, to every branch of design. It was desirable, that this school should be upon an economical principle, and within the reach of almost every one. It was thought unadvisable to make the admission so expensive as that at the school of design in London; and, though nothing had been adopted, 5*s.* a quarter, or 1*l.* a year had been proposed.

Mr. Richard Birley, in moving the fourth resolution, was disposed to question the propriety of having the admission very low; for it was of more importance, in his opinion, to secure the very best masters, and then they would easily get students to pay more. He knew a case of a young man, who, because he could not get sufficiently instructed at the Mechanics' Institution, had private masters, at a cost which he could not well afford, that he might secure for himself the best instruction. If the admission were low, then a large subscription of members would be required, in order to have the best masters.

Mr. Louis Schawbe, in moving the fifth resolution, said that he had recently been engaged in fancy weaving, and he believed he had produced as good work, in his particular branch, as any house in England. He was the more friendly to this institution, and the more ready to support it, as he must confess that, were it not for the little instruction he had received in the art of drawing, he should never have been able to attain to that eminence in his manufacture. He hoped the admission would be as low as possible. The town in Germany in which he had been educated was a small one, containing not more than 8000 or 9000 inhabitants; and, though it had no school of design, it had a general school, in which drawing formed a part of the institution; and at this school all attended, whatever their profession or trade. The admission was very low; and, the master's salary being defrayed by government, the

payments of the pupils were applied to providing things in the school for their use. It might be amusing to hear the price paid by the scholars. He had two lessons weekly in drawing, for which he paid 10*d.* a month; and he had some extra lessons from the master, who was considered a very clever man; and for four extra lessons weekly, he paid 6*s.* a month. He hoped that the masters in this school of design would be paid by government, so that the admission might be a low one; as the importance of a knowledge of drawing to every one engaged in manufactures was so very great, that he had no doubt the country would be repaid, by the beauty and value of our future manufactures. He had no doubt, that the study of the figure would be very important; at the school at which he had been educated, it was left to the choice of the pupils; and, though not insensible to the advantages of figure drawing, he hoped the choice of studies would be left in the hands of the pupils themselves.

Mr. Joseph Adshead, in seconding the resolution, said that great praise was due to Mr. Hance and Mr. G. Jackson, for their indefatigable exertions in calling public attention to this subject. He thought the cheaper the institution offered, the more likely it would be to be generally diffused. He had no doubt, that, in a few years, the institution would be second in utility to none in the town.

It was also observed, that when a new design for weaving was wanted, it was generally obtained from a French silk, or from some German weavers settled in England; and it was proposed that a memorial should be signed praying government to assist the institution with casts from the British Museum.

Mr. Bostock moved the ninth resolution, "That classes for the instruction of females in the fine arts be established, under suitable teachers;" and said he thought this an extremely desirable object, especially in connexion with manufactures; as females of fine taste, and well instructed in art, might be employed in producing various elegant and beautiful designs, highly acceptable to calico-printers and to manufacturers. (*Manchester Guardian*, Feb. 21. 1838.)

SCOTLAND.

EDINBURGH. — *Effects of the Lightning on the Melville Monument, struck on the 14th of July*, 1837. (See Vol. I. p. 200.) — The following particulars are curious: — The door which leads to the outer plinth at the top of the monument, immediately below the statue, fell to the bottom the instant the monument was struck; but, upon being inspected about threequarters of an hour afterwards, there did not appear any of the usual effects of the electric fluid upon the ironwork or otherwise. The key of the door below, which leads to the top of the monument, was obtained, and upon entering it no appearance of damage could be discovered. On reaching the top of the stair, however, it was found that the stones which form the apex of the central part of the monument, upon which the stair rests, and which are perforated from the cupola to the bottom, on purpose to admit the conductor, were dislodged. The conductor was a chain, part of which was discovered still hanging at the top of the cupola, immediately underneath the statue. The rest of the chain was not to be seen, but upon descending to the bottom, and looking underneath the centre, upon which the stair is fixed, the chain was found in a heap, quite hot, and having a white calcined appearance. It would appear, therefore, that the door had not been struck by the lightning, but had been forced out by the concussion, arising from the aperture, which leads down through the centre of the stair from the top of the monument, being too small to admit the shock; which circumstance causing a momentary interruption, had had the effect of dislodging the stones at that place for a couple of yards, wresting the door from the hinges, and breaking the chain. From all these circumstances it would appear that the conductor saved the monument. (*Caledonian Mercury.*)

ART. II. *Reply of M. F. A. Bernhardt, Architect, to the official Report of Dr. Ure, F.R.S., on his new System of Warming and Ventilating, published in the "Architectural Magazine" for January*, 1838.

In replying to the attack made by Dr. Ure in the *Architectural Magazine* of January (p. 31.), upon my new system of warming and ventilating, and myself, I can only be sorry that a gentleman of his high standing and medical reputation should have so far forgot himself as to use language which, I am sure, none of the readers of the *Architectural Magazine* will have approved of, and which Dr. Ure himself, on reflection, must find blameable and unjust. Far be it from me to impute any bad motive to Dr. Ure's late publication of his report to the Hon. Board of Customs; and, taking it only in a scientific point of view, I will as briefly as possible confine myself to the exposition of its fallacies; and, against any future attack, simply refer to my actions, and the various works I have executed.

In the publication of his report, Dr. Ure acted very unfairly not to inform the readers of the *Architectural Magazine* of the time when he examined Lord King's house; for, though the said report is dated November 23. 1837, the examination took place as early as July; and every architect and scientific man will allow that neither that month, nor when the walls of a new house have just been covered with plaster, is the fit time for judging of the effects of a warming apparatus, except its effects of drying. The air-flues, &c., necessary in my system of warming and ventilating, were finished in Lord King's house on the same day on which the last coat of plaster was put on the walls of the servants' hall (basement story); and on the same day (July 15.), likewise, the fires in my apparatuses were lighted for the first time. Lord King wishing to move into his mansion at the beginning of September, and there being still much to be done by Mr. Cubitt, the builder, I was obliged to satisfy both, and to dry the house in as short a time as possible. I therefore ordered the fires to be forced (for I did every thing in my power to oblige His Lordship, whose house, but for my regulations, would not have been dry and inhabitable, perhaps, for six months to come), and requested Mr. Cubitt to withdraw his workmen from the house; assuring him that they would risk their lives if they dared to work in the same whilst the overheated air, charged with moisture and the lime vapours extracted from the walls and plaster, was in circulation. The temperature of the atmosphere at that time was 72°; and, therefore, no wonder, when, in consequence of the large fires which were kept up day and night, the air in the apartments was raised as high as 95°. It would not otherwise have been possible perfectly to dry Lord King's house in three weeks, a thing without parallel; and I challenge Dr. Ure to point out to me any other system of warming and ventilating capable of producing the same effect in the time specified. Many of the leading architects, doctors of medicine, and other scientific men, passed the highest eulogium on my plan as exhibited at the said mansion; and a nobleman of Scotland, happening to be present on such an occasion, took me with him to Scotland in order to apply it to his residence, where Mr. Silvester's regulations had totally failed. Returning to town, I heard of Dr. Ure's examination of my plan, which had taken place during my absence; and that he had spoken very unfavourably of it. The workmen who told me this, not having, previously to Dr. Ure's visit, heard anything but what was favourable, and that, too, from really competent men, were rather amused by his exposition. Among other things, they told me he had put his thermometer *into the smoke-pipe!* He himself says, in his report, that, having put solder *into* the lower pipes (which, as I learn, remained there all the night, the fires in the same being always up), he found it not only melted, but oxidised. Dr. Ure wonders at this, though it is quite natural; for, not only solder, but even metal, will melt in my fires, and for very obvious reasons. It does, however, not follow that the air outside must be bad because the fire

inside burns so well, except when the latter is expressly kept up for *drying*; in which case even, the air is better than that of any other apparatus, on account of the incessant circulation and continual supply of fresh air. Every gentleman will certainly agree with me that, before publishing such an important document as the report in question, Dr. Ure should have as minutely as possible enquired into the subject; which he, however, omitted. He saw my apparatus, in the first instance, when heated to the highest possible pitch; from which point his judgment emanates. He saw my regulations, in the second place, when no fires at all were lighted; when he would, however, by paying anything like attention to the subject, have perceived that, notwithstanding the icy coldness of the stoves, the *ventilation was going on* as well as ever. He, in the third place, declined an examination of my system in my presence, at which I would have given every explanation required, by pleading "want of time." Did Dr. Ure, after this, act nobly towards a foreigner, who never interferes willingly with any one, and least of all with medical science, and who almost shrinks from defending himself? If my system of warming and ventilating strikes at the root of every other, can I help it when I interfere with the interests of many, against my will? At p. 34. of the *Architectural Magazine*, Dr. Ure says, that "in one of the stoves there were 16 pipes," whilst there are only 12, and the other three apparatuses are much smaller. Two of the fireplaces are each 18 in. long, 8 in. wide, and 8 in. high. Can in such little space much fuel be consumed? Had Dr. Ure postponed his examination till January last, he would have found that the apparatuses are not a foot too large; that the air is most delightful, and that it can be regulated at pleasure; and Lord King's house is, moreover, not so small as represented: it contains more than 200,000 cubic feet of air. Dr. Ure evidently shows, by his writings and the said report, that he has never practically had anything to do with warming and ventilating; his theoretical opinions must therefore, through that very want of practice, be erroneous. (If he has ever warmed and ventilated any building, I must beg his pardon for being ignorant of it.) Without practical knowledge of warming and ventilating, no one can be surprised when he, in his own words, "acknowledges himself incapable of discovering either the novelty or the worth of my scheme," having seen so many similar ones on paper. For more than twenty years, I have made the science of warming and ventilating my exclusive study, and, through my persevering exertions and unremitting labours, have been crowned with the most happy and wished for results; yet have I never flattered myself with the hope of quickly establishing the truth and infallibility of my plans, because I know how difficult it is to introduce anything new. I hold it wrong myself rashly to adopt, but more so rashly to condemn, a new doctrine; but, first to examine it carefully, shows much prudence; and to support it when found worthy, is evidence of genius and a truly great mind; and I am happy to say that I have met with many of the latter.

Dr. Ure says that I am but very slenderly acquainted with the principles of warming and ventilating; to which I cannot better reply, than by referring to the various works I have executed. If Dr. Ure had any practical knowledge of warming and ventilating apartments, he would have known beforehand what effects would be produced by the stove he put up in his bed-room, and which might have caused his premature death. I am sure, many of the readers of the present paper would have told him the consequences if he had consulted them beforehand. Can it be healthy where there is no ventilation? and is there any kind of stove to be put in a room that produces effective ventilation?

With regard to the accumulation of soot in my apparatuses, Dr. Ure, as in all his statements, is equally wrong; for it is not necessary to clean the apparatuses in Lord King's house more than twice or thrice a year; and, if my apparatuses, according to circumstances, need cleaning oftener than the chimneys at present in use, it is much more easily done, in the basement story only, and without the necessity of climbing boys. The soot which is thus deposited in, and so easily removed from, my apparatuses, would otherwise

impregnate the atmosphere; and, consequently, an additional advantage is derived. Were my plan generally adopted, thousands of fires would be unnecessary, danger of fire so many thousand times diminished, and the atmosphere, now so injurious, and productive of consumptions, would be rendered clear and healthy.

Security against fire is one of the chief recommendations of my plan; and I beg to observe that many of the buildings which have recently been destroyed by fire would not have become a prey to the flames if they had been provided with my plan of warming, ventilating, and lighting. I can adduce an instance where it has been tried to set fire to a house with my stove, adapted to single or several rooms; but, though the wooden handle of the door, 4 in. distant from the iron, was totally burned, and the back of the stove cracked, yet it was found impossible. Any gentleman who has the opportunity of examining my regulations in Lord King's house will find my assertion borne out, and that with my plan no fires can happen. As to the expense of the flues in Lord King's house, I must observe that I usually order them to be made of brick, which is ten times cheaper than the use of slates. Lord King, however, who is well acquainted with architecture, knew beforehand that the slates were more expensive than bricks, and adopted Mr. Cubitt's suggestion to use the former, on account of their not taking up so much room.

To speak of the inevitable failures, immense expense, danger, trouble, and waste of fuel, of the warm-water and steam apparatuses, which Dr. Ure finds so highly commendable, is quite unnecessary, the subject is too well known to require any further exposition.

The, as it were, living witnesses which I am going to point out to the readers of the *Architectural Magazine*, will fully prove, though my plans may be apparently similar to others, its entire novelty and never failing efficacy; and will render it superfluous to analyse further Dr. Ure's hasty report. I can only add, that I regret very much not having been honoured with the examination of my regulations by the members of the Hon. Board of Customs, who, I am sure, would have been fully satisfied with my plan, as well as the many who have adopted it; and I am proud to say that, in recommending my system, I have invariably referred to works of mine already in existence. Had these works been wanting, I should not have received the certificates annexed.

In concluding this very unpleasant duty of defending myself, I hope that every impartial gentleman will see how unjust and ungentlemanly are the observations of Dr. Ure at the end of his letter.

I beg finally to refer all friends of science to the following particulars of what I have done in warming and ventilating, and of which I shall speak more amply in a pamphlet now preparing for that purpose; hoping that, after careful examination, they will lend their assistance in the diffusion of a most beneficial discovery.

92. *York Road, Lambeth, Feb.*, 1838. F. A. BERNHARDT.

P. S. As to what passed between Dr. Ure and the friend who introduced me to him, I am ignorant of it; but, if the gentleman (Thomas Griffin, Esq., of Cheltenham) advised him not to publish an unfavourable report on my system of warming and ventilating, it could only be well meant, and given in a friendly spirit.

Description of Buildings warmed and ventilated by my Plan, and a few Circumstances connected with the same.

From an advertisement which appeared in the newspapers in the autumn of 1836, I received a letter from Lady Webster, at Battle Abbey, near Hastings, with an invitation to come down, in order to examine several apartments of the Abbey, and to warm and ventilate them according to my plan. On inspection, my attention was particularly directed to an arched room, 58 ft. long

and 21 ft. wide, which, according to the report of Lady Webster's builder, an elderly gentleman, and other persons acquainted with the place, had always been so wet and damp as to render it uninhabitable, and only fit for the exhibition of antiquities, &c.; and, to judge from its appearance, I should say that it had been in that state ever since it was built, about 800 years ago. The said room had, in the year before (1835), been newly painted; the paint was, however, soon, by the water penetrating through the walls, changed into a mass of bladders, which, bursting, let the water out. The first question which Lady Webster addressed to me was, whether I thought myself capable of drying this room; assuring me that several attempts had been made for this purpose, but all in vain. When, in presence of the builder, I replied that I would undertake it, and that I would guarantee to dry the apartment in a very short time. He said quite candidly he did not believe it, for it was impossible to dry a building, the foundation of which was so swampy. Lady Webster, however, observing that she had already read in the public journals of what I had done in the Royal Palaces of Berlin, ordered, on my assurance not to demand payment if I failed, an apparatus to be put up. The apparatus having been erected, and the fire lighted, the water, in a few hours, poured down the walls and arches in such quantities, that it was taken out by pailfuls. Lady Webster was afraid this would continue, as the builder maintained that the water proceeded from the foundation. Being, however, assured by me that it would last only a few days, she was satisfied, and I returned. A couple of days after this, I had the pleasure of receiving the following letter from Lady Webster:—

"M. Bernhardt,

"The arched room, I am glad to say, is perfectly dry, and the two rooms above sufficiently warm. You have there accomplished what you undertook to do, and I am quite satisfied. Yours, &c.,

"*Battle Abbey, February* 28. 1837. C. WEBSTER."

At the recommendation of an architect of the first rank, I substituted for an ineffective steam apparatus one of my stoves in the library of Sir George Smart, for the purpose of drying his valuable musical books, which by the former plan had become damp; as also to warm the room pleasantly, and which could not be obtained by the old plan. The usual success attended my operations; and I may be allowed to ask if a system of warming and ventilating can be unwholesome and bad, if such results are obtained; and when by it a healthy, pleasant, and ever-changing air is introduced into the room?

The same nuisance as above, dampness and nauseous smell, I have removed in other places; but, having given two instances, I do not think it necessary to enumerate more.

At the house of Mr. A. Black, No. 8. New Wellington Street North, my plan has been in operation for more than two years, to the perfect satisfaction of Mr. Black, who wishes no other fires in its stead. I may here be allowed to refute Dr. Ure's charge, that my apparatuses consume more fuel than any other at present known. Mr. Black has in his large kitchen an apparatus upon which meals of all kinds can be prepared, with which the warm water necessary for the wants of the family is supplied, and with which the kitchen, the shop, the warehouse, the drawingroom, and two bedrooms are warmed and *ventilated*, and all this at the expense of one shilling per day. Is there any cheaper plan? In the smaller kitchen of Mr. Black's house, one of my patent stoves, with an open fire, is put up, and used for the following purposes; namely, the roasting of meat, and the warming of the kitchen, the passage, and staircase from the bottom to the top of the house, the back drawingroom, and two rooms above it. The whole of Mr. Black's house is thus, with the exception of two small rooms, in which there are common fire-grates, thoroughly warmed and ventilated by these two apparatuses.

Dr. Ure will find these stoves with open fires quite different from the one

he put up in his room, and which acted so very injuriously on his health. They, for instance, *never* smoke, simply because they are constructed on unerring scientific principles.

The house of Mr. P. J. Meyer, Laurel Lodge, Hammersmith, has been provided with my warming apparatus; and, besides its efficiency for kitchen purposes, it warms the two passages, two staircases, two drawing and two bedrooms. It has been in operation these two years, and is now in as active operation as ever, to the entire satisfaction of Mr. Meyer, who, as well as Mr. Black, will be glad to show my regulations to any gentleman who will let him know his intention to inspect the same.

Having warmed and ventilated the private residence of Mr. Currie, the eminent banker, I had the pleasure to receive the following letter from Mr. Barry:—

"Foley Place, Wednesday Morning.

"Sir, I am happy to inform you that Mr. Currie is satisfied that nothing can answer better than the means you have applied for warming his house at East Horsley. Yours faithfully,

"CHARLES BARRY."

About three years ago, my system of warming and ventilating was examined by some of the first architects of this country; and I was honoured with the inspection of my plan by several noblemen, and some of Her Majesty's ministers, who all highly approved of it. The architect, Mr. Hiort, who had dedicated many years' study to the subject of warming and ventilating, and the draught of smoke, was very much pleased with the regulations I had adopted in my house; and, in a lecture delivered in the Institute of British Architects, acknowledged his satisfaction with my plan. I had at that time the pleasure of receiving several orders from the leading architects, which I value very highly, inasmuch as it will be evident to every one that practical architects are more capable of judging of the merits of any plan, than a person who has collected his knowledge from books only. When, last year, I was enabled to show my system on a larger scale in Lord King's house, I had again the pleasure of seeing there many architects, and other scientific gentlemen, who all, as before mentioned, expressed *their entire satisfaction with it*. My regulations having also gained to me the confidence of Mr. Charles Barry, I had the pleasure of seeing myself honoured, at his recommendation, through Sir Benjamin Stephenson, with the order to apply my system of warming and ventilating to the new committee-rooms of the late Speaker's house.

The perfection, or imperfection, of any system can be determined and judged of by feeling or sensation only; and a minute description of my plan, as applied to the Speaker's house, is therefore unnecessary. But I beg to invite the readers of this Magazine to its inspection, in order to judge by their feelings of its efficacy. Whoever has seen the cloister before, will know how cold and damp it was; whereas he will at present, though my regulations are not totally finished, and the doors and windows are left open, find it dry, sufficiently warm, and habitable in all parts; and, like the many who daily sit and walk in its passages, not refuse his share of approbation.

Those who have formerly been in the late Speaker's dining-room will know that a very unpleasant smell was constantly diffused in it last year. In order to get rid of this nauseous smell, an immense fire was kept up day and night, but to no purpose; at present the room is dry, warm, and filled with pure air. When asked by Sir Benjamin Stephenson whether I could do away with the said bad smell, I assured him that I could, and that, in case of failure, I would claim no payment for my regulations. If I was not sure of the efficacy of my plan, would I undertake guarantees like this?

In the Speaker's house, every one may convince himself that my regulations for warming and ventilating are without danger of fire; that it is even impossible to set fire to a building by the same, if it were attempted. As a proof of the truth of this assertion, it will be found, in the committee-room No. 12.,

that the ventilators, quite near to the hot pipes by which the air is warmed, are fixed in wooden frames. In order to dry the committee-rooms Nos. 11. and 12. quickly, the fire in the stove was, like that in Lord King's house, and without any further security against destruction, kept up to the highest possible pitch day and night; so that the temperature of the air was raised to 112° and more, and the walls of the rooms became pretty much heated. The air which passed through the wooden frame was above 170°; notwithstanding which, not the least appearance of inflammability was observable, and it remained unmoved in its place. The only disadvantage which arose to me from this forced drying was, that the upper part of the stove, cast iron, 2 in. thick, was cracked, and that a new stove had to be supplied. The same case happened with a second stove, for the same reasons. This second stove warms the five rooms above the crypt (or late Speaker's dining-room) and passage, containing about 55,000 cubic feet of air; a mass of about 1,500,000 cubic feet of air is therefore warmed in twenty-four hours by one of my apparatuses, and passes through the rooms day and night, constantly renewing the atmosphere in the same. That such a change of air must exercise a wholesome influence on the health of the gentlemen who assemble in the said rooms, will be obvious. The said mass of air requires, during twelve hours, 1¾ bushels of coals in the coldest winter time, to be warmed in such a manner as to keep the temperature constantly up to 65°.

The temperature of the air in the committee-rooms can be regulated and kept up at pleasure; and, for the information of the honourable members of parliament, notices have been put up on the doors of the said rooms, by which they are desired to order any temperature between 48° and 65° which they like best. This will prove to Dr. Ure that there must be a good ventilation; and I ask him to show any building, warmed by steam or hot water, in which there is the same command over the temperature; or in which it is in the power of the fire-keeper to produce and keep up the desired temperature without creating a perceptible draught, as is done in the committee-rooms. Would such a ventilation be possible if there were no change of air, and if the foul air remained at the bottom like filth and mud in water? I beg every one, who would convince himself of what I have said here, to go to the late Speaker's house, and visit a committee-room with an open fire when crowded; then to visit one of the rooms warmed and ventilated on my plan; and to make a comparison. If the trouble were taken to put an equal number of persons in two rooms containing equal masses of air, I am convinced that every impartial man would acknowledge my ventilation to be more perfect than any other. For this purpose, I would propose one of the dining-rooms ventilated on my plan; for the ventilation of the other rooms is partly unfinished, and partly disordered by the alteration of several of the rooms. Thus, for instance, one room has been made use of as a smoking-room for the honourable members; and it will be obvious that a ventilation adapted to a room for about thirty or forty persons cannot possibly answer the purpose of leading off the smoke, as it is necessary: carbonic acid gas and smoke are two totally different matters. It would therefore be wrong to judge of my ventilation, destined to supply for respiration the purer and consequently lighter air (in this respect, very near the property of smoke) from above, so that nothing but pure, light, and pleasant air is breathed, and passes to the lungs, by producing smoke in a room ventilated according to my system for respiration only, either by tobacco, gunpowder, or any other substance. Every one will agree with me, that a room, to be used as a smoking-room, requires a totally different ventilation from all those at present known. By means of my discoveries, I am enabled to satisfy every wish with regard to ventilation, and, consequently, also to ventilate a smoking-room in a perfect manner. The following, however, shows at the same time how strictly my directions must be executed, if a perfect ventilation is to be obtained; as, also, that there must be some theory, of which Dr. Ure thinks me so devoid, to give such positive, infallible, and experimental directions for ventilation.

The openings of the air-flues to one of the lamps in the dining-room were, against my order, instead of being to east and west, made to north and south; most likely with the belief that it was quite the same to have the openings the one way as the other: the consequence, however, was, that the lamp was blown out in this one flue, and not in the three others in the same room, which were made according to my directions. After the reversion of the openings of the said flue, it acted as well as the others.

The many experiments, for years and years, have shown, how difficult it is, without the knowledge of the true laws of nature, to effect an agreeable ventilation, and to know that the least alteration in a building, or its neighbourhood, can render faulty the best ventilation. Of all this Dr. Ure is innocent, else he would not have judged and condemned my ventilation so hastily.

The warming and ventilating of M. Scheibler's large silk manufactory and residence at Crefeld, on the Rhine, I reckon amongst the most important of my works: the system has been there in operation for more than four years, to the satisfaction of all inmates. Mr. A. Black of New Wellington Street, as well as M. T. A. Wortmann of 9. Cirencester Place, Portland Road, who are familiarly acquainted with it, will confirm my statement if applied to.

The invariable success which, for the last ten years, attended my operations, procured, me among a number of others, the following certificates:—

From His Majesty the King of Prussia.

"By His Majesty's command, this testimonial is given to the architect, M. F. A. Bernhardt, that he has remedied the inconvenience of smoky chimneys in the Royal Palace, as well as in private houses, although all former attempts to do so have proved ineffectual.

"(Signed) V. Schuchmann,
"*Berlin, April* 22, 1831. Minister for Commercial Affairs."

From the first Architect in Germany.

"M. Bernhardt has, by his process, removed the inconvenience of smoky fireplaces, both in rooms and kitchens, wherever it was troublesome, to the greatest satisfaction of the occupiers. In proof of which I send him this testimonial.

"Schinkel,
"*Berlin, Sept.* 6. 1832. Chief Director of Buidlings."

"That the architect M. F. A. Bernhardt, one of the founders and members of the Leipzic Polytechnic Society, in grateful acknowledgment of his strenuous exertions to forward trade and industry with all his powers, has, by the members of the said Society, unanimously been named deputy of the same; and, also, that in this capacity he has rendered himself highly meritorious, by his advice and assistance, is hereby certified, with thankful acknowledgment, and in full truth.

"*Leipzic, in the Month of May*, 1829. "Otto K. Erdmann, Director.
"The Directors of the Leipzic Polytechnic Society." "G. Wolbrecht, Secretary.

This certificate will convince Dr. Ure that I was in Saxony.

Testimonial.

"I hereby certify that M. F. A. Bernhardt of Düsseldorf, architect, has been particularly recommended to me, from the most respectable quarter, as a person who may be strictly relied upon, and possessing undoubted skill in his profession; and, also, that it especially appears, by the testimonials which he laid before me, and which are granted by unquestionable authorities, that he

has succeeded, at several places in Prussia, in bringing into practice his invention for the conducting of smoke, with the most successful results.

"*London, December* 30. 1833.

"(Signed) BULOW,
Ambassador of the King of Prussia.

"Certificate for the Architect M. F. A. Bernhardt of Düsseldorf."

"*Friday, March* 2. 1838.

"Dear Sir, I was much gratified, on Saturday last, in witnessing your mode of warming and ventilating rooms at the Speaker's house. The feeling of warmth and dryness of the rooms is particularly agreeable; and, from your simple but excellent plan of keeping a constant renewal of the air without producing draughts, must be greatly conducive to its purity and wholesomeness. Your plan of regulating the supply of warm and cold air seems to be excellent; and, as one of the chief causes of foulness of the air in crowded rooms is the quantity of carbonic acid gas thrown off from the lungs of those breathing in the room, your method of causing this (which, being heavier than air, falls to the bottom) to be carried off by holes at the bottom of the room, is good, and certainly more likely than any other I have seen to produce the effect of keeping the air in the room wholesome.

"I shall be very glad to hear of the general adoption of your plan, and, in mean time, remain, &c.

"(Signed) NATH. GRANT, M.D.

"21. *Thayer Street, Manchester Square.*

"To M. F. A. Bernhardt."

ART. III. *Retrospective Criticism.*

MR. HUMPHREY's Suggestions as to Models of Style, &c., (p. 49.)—I shall not attempt to follow Mr. Humphreys through all the reasonings of his "Suggestions," &c., contained in your last Number. If architects have been so much led astray from the mark, and are so wide in their attempts at Gothic, it is not by writing that the evil is to be corrected, but by example; and an executed design will have a far more powerful influence than whole volumes of essays. In fact there is not an amateur traveller, or a writer with some facility of composition, who does not mistake a partiality for architecture for an innate purity of taste, and a power to discriminate and apply, and he then begins to lecture the architects, as men who do not know what they are about.

Never was critic more mistaken than is Mr. Humphreys, in thinking that he has been the first to suggest that Mr. Barry should have consulted the Hotels de Ville of Germany and the Low Countries, as models for his Houses of Parliament. Mr. Barry *did* study these monuments, and spent a fortnight in those countries for the purpose of preparing his mind by the contemplation of those fine works, before he made out the drawings of his magnificent conception. That Mr. Barry's design is not a mere copy, that he has combined, and admirably too, the peculiarities of the styles of these countries with that of England, and thus produced a new combination of the excellencies of both, has misled Mr. Humphreys, who did not see in the imposing general mass of Mr. Barry's design the main feature of the Hotels de Ville, and in the details such a reference to English models as produced an amalgamation at once novel and effective.

Never did man better deserve by the efforts of his genius the selection made by the Commissioners; never did man gain a prize in a more honourable manner as regards his own conduct. But the various attacks which have been made upon him, whether in reference to his judgement, his taste, his honour, his integrity and good faith, have been unceasing and unsparing. I trust he sees few of them, for they are enough to quench the ardour and perseverance of any man. To carry out into execution so vast and complicated

a work, is surely a sufficient tax upon the noblest and firmest spirit, and, instead of our discouraging him, we should do all in our power to brace his energies, to excite his ambition, to confirm in him a confidence of his own powers. This alone can enable him, with all his energies, to complete a work which shall render this age illustrious for its taste in architecture, reflect credit on our national character, and stamp himself as worthy the high task, which has been confided to him. In spite of every adverse circumstance, he must and will realise the best anticipations of those who know, and who, knowing, esteem and admire him.'— *M. I. B. A. Feb.* 1838.

Mr. Parsey and his Critics.— Perpendiculars. It is amusing to read the different ideas of different individuals on the convergence of perpendiculars. I will even risk the presumption of asserting that there is a mixture of truth and error in all I have yet read on the subject. All that Parsey, Edmonds, Candidus, Kata Phusin, and Pocock have said or sung on the matter, may be finally settled by the following questions and answers, in the plain "why and because" style, which even those who know nothing of the subject cannot misunderstand: —

1. Do perpendiculars converge?—Yes.

2. Why do they do so?—Because it is a law in optical mathematics, that all objects diminish in proportion to their distance from the eye; and every object we look at establishes its truth.

3. This being the case, should not perpendiculars be represented in perspective as converging?—Certainly not.

4. Indeed! would you then represent a tower 100 ft. in height, equally as wide at the top as at the bottom, while you might be 103 ft. from the former and only 10 ft. from the latter; and would not this be inconsistent with your second answer?—Now, I shall solve the difficulty. No one can represent a tower of that height, while standing at a distance of 10 ft. from the base; because, the eye cannot, without moving, take in objects at a greater angle than 60°; therefore, before a tower of 100 ft. in height can be represented, I must be *nearly* 100 ft. from it; then, the *difference* of the distance from my eye to the top, and to the base, of the tower is so small, that the convergence is imperceptible.

5. So far good. But why must you be *just* "nearly" 100 ft. from the building?—Because, if my eye were level with the base, I must be *wholly* 100 ft. Now, my eye is supposed to be 6 ft. above that level, and that is the reason; and if my eye were at a point exactly 50 ft. above the level of the base, then, to represent the tower, I must at least be at that distance from it which will bear the same proportion to its height that the side of a square does to the hypotenuse. Of course, I may be at any greater distance I please.

6. Why "*at least*" at that distance?—Because then the ray from the eye to the top, and the ray to the base, would both be exactly of the same length as the height of the tower (forming an angle of 60°); and the eye would be at the apex of a cone, the diameter of the base of which would be 100 ft., while the length of each ray forming the same would also be 100 ft.

7. Is there any other reason why perpendiculars should not converge?—Yes, technically speaking; because they are perpendicular to the imaginary horizon of the picture, and parallel to its sides.

8. Why then are parallel horizontal lines in angular perspective represented converging, while parallel perpendiculars are not?—Because the surfaces which they bound or circumscribe, are obliquely presented to the plane of projection, that is, the plane of the picture.

9. Then do parallel lines, when they present themselves parallel to the plane, converge?—Yes.

10. Should they be so represented?—No; for exactly the same reasons as given for the tower: for we must consider the eye a point, without reference to where our head or feet are; as, if we were to lie on our side while looking at a range of buildings parallel to the plane, we would then have a figure similar to the tower, which would, of course, be subject to the same laws.

11. It would then appear that Candidus is wrong?—Yes; because the laws of optics, and, indeed, all the objects we see, contradict his theory.

12. Parsey then of course is right?—No. In this particular, he is only right so far as he contends for the convergence: he is wrong in his representation of perpendiculars for the reasons given to Question 4.

13. Is Edmonds then, who opposed him in some points, right?—No. He has followed the errors of Mr. Pocock, together with some new ones of his own, respecting the appearance of pictures, and the hanging of them, which are not in accordance with the foregoing reasons.

14. Is Kata Phusin right?—Yes, in the chief points; but not strictly so in the minor ones: and the same remarks may apply to Mr. Pocock.

15. How far do the minor points of the latter two gentlemen vary from truth?—In my opinion, so far as they differ from the substance of the foregoing answers; which, to my mind, are as plain as it is that two and two make four.

16. Has Candidus acquitted himself from the charge of error, by Parsey and others, in his rejoinder to them?—No; he is equally inconsistent throughout. In his first paper, he distinctly denies the convergence of perpendiculars; in his rejoinder, p. 140., he says he never disputed that the system was theoretically correct; and in p. 141., he actually admits that he did deny the convergence of perpendiculars, but "*meant*" something—something, in fact, which he did not state.

17. Is Candidus right in his remarks (though, of course, ironical) respecting the representation of the Tower of Babel?—No; he is positively wrong; because, in proportion to the height of the object, so must be the distance between the object and the eye that views it; consequently, the vertical lines of this *great* Tower ought to be as free from convergence in the representation, as those of a two-story house, the same principle governing both. (See Answer to Query 4.)

18. Is Candidus's remarks with regard to the cut at p. 91., of the Glyptotheca at Munich, correct?—No; the position of the horizon in that representation may not be in the most happy, or best selected, situation; but it is not "erroneous." His position would hold good if we could only view objects when we stood on a level with their base.—*Q. March*, 1838.

Candidus on Mr. Parsey's Principles, &c.—Candidus is indignant at being accused of disputing Parsey's principles theoretically, and complains that he has been misunderstood. He has just cause of complaint, if he did *not* mean to say that perpendiculars appeared non-convergent to the eye. I believe him to be suffering under a calamity, to which men of talent are peculiarly exposed, that of not knowing exactly what he did, or does, mean. If he first "denies the convergence of vertical lines," and then tells me that "all he meant was, that it was not perceptible," he should not be surprised at my replying to what he *said*, before he had told me what he *meant*: and his meaning is no meaning, even now, for the convergence of verticals is as much perceptible as that of any other lines. He ought to mean, and, I believe, does, if he could find it out, that, where such convergence can be represented, it is imperceptible, and where it is perceptible, cannot be represented. And, if Candidus is anything of a draughtsman, he ought to know that the theory is *not* unimportant because impracticable. None can be daring or dexterous in practice who are not thoroughly acquainted with the most speculative principles of theory; and I believe I could give him several problems, which all his knowledge of perspective could not solve, without the assistance of the principle which he spurns. Here let the subject rest, since it seems we all agree now that we understand each other; and it has occupied several pages of this Magazine already, having itself nothing to do with architecture. Parsey will not turn the world upside down, as Candidus dreads; every true artist being about as well aware of what is right, as that revolutionising gentleman. And now let Candidus allow (unless he requires to be put in mind of Corydon's warning, "Quamvis tu Candidus esses, O formose puer, nimium ne crede colori"),

that he expressed himself obscurely; and Kata Phusin will beg to be permitted to advance *his* name, as an apology for his eagerness in the support of a theory which, he is willing to allow, is not so much *kata technēn*, as it is — *Kata Phusin. Oxford, March* 5.

The Chancel of Stratford Church. (p. 139.) — Considering that the opinion of an architect upon a subject of taste connected with his own works is one to which little weight can be attached, I offer no further observation on the criticism of B., than that the defect of the omission of a straight tie at the foot of the principal rafters; and "the principle being more like that of an arch depending on the side walls for abutments*," if a defect, is equally chargeable on the majority of good specimens of timber roofs erected at the same period, as that of the chancel of Stratford Church; and, to any one who will attentively examine the building, it will be evident that such was the case with the original roof of this chancel. Of roofs constructed upon similar principles, several exist in the halls and ecclesiastical edifices of this country; which, in the case of Stratford Church, is considerably strengthened by the introduction of iron ties and stays, concealed in the carved spandril, and by queen-bolts in the mouldings, forming the tracery of the roof without resorting to so objectionable a proceeding as introducing a tie-beam across the window, or destroying the external character and picturesque effect of the building by raising the walls. Of its full sufficiency for the purposes of strength, I had an opportunity of satisfying myself by a careful examination of the work a few weeks since, it having now been finished more than twelve months. — *Harvey Eginton. Worcester, March* 8. 1838.

Glyptotheca. — I am glad that my reference to Dr. Granville's account of this building has called forth H. N. H.'s remarks, although I cannot help thinking him rather premature in terming it "florid," when by his own admission he has not seen the work. He appears to misunderstand the cause of my admiration, which was not produced by the mere circumstance of its being built entirely of marble, but by the purity of its style, the excellence of its arrangements, and the grandeur of the whole design. Nor do I rest solely on Dr. Granville's account, for his statements have been fully confirmed by descriptions I have had of the Glyptotheca, from friends on whose judgement I can rely; and who, having seen it, speak with equal enthusiasm of its merits.

The following extract, which Dr. Granville gives at the end of his own description, from a recent English writer (whose name he does not mention) will show that others differ from the opinion which H. N. H. has formed of this edifice. "The contrast between this building and the appearance of the vast hall at the British Museum, built for the reception of the Elgin Marbles, nay, even of the galleries of the Vatican and the Louvre, is most striking, and tends to prove that the Baron Klenze has been successful in his bold and arduous undertaking." — *G. B. W. London, Feb.* 23. 1838.

Errata. — P. 107. line 5. from the top, for "about one mile and a half," read "half a mile." P. 109. line 27. from the top, for "15 ft.," read "18 ft. ¾ in."

Institute of British Architects deferred for want of room.

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*"The timber roofs of our ancestors, in the style called Norman or Gothic, were generally made without horizontal ties at the feet of the principal rafters, and were intended to be supported by the walls, as an arch is supported by its abutments; the heavy walls, they were in the habit of erecting in the Norman style, and the skilful disposition of buttresses in the Gothic, rendering ties unnecessary. Besides, a tie-beam would have been wholly incompatible with their mode of finishing the interior of a building." (*Tredgold on the Construction of Roofs*, p. 86.)